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**STPs and collective thinking:
the experience of TECNOPUC**

Parallel session

Collective thinking to promote collaboration

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Executive Summary

The Pontifical Catholic University of Rio Grande do Sul (PUCRS), with its Science and Technology Park (TECNOPUC) epitomizes the interaction between university, government and industry, the convergence of their efforts and promotes joint collaboration. The recognized leadership of TECNOPUC nationally and in Latin America now requires innovative and disruptive actions as a form of knowledge creation, dedicated to the generation of innovative and technology-based companies. In this context, two new initiatives have been developed within the innovation ecosystem, already underway today. One is the GLOBAL TECNOPUC, as a convergence hub for sharing and co-creation of ideas and projects and the other, the Strategic Resource Mapping Program (SRM) as a platform for promoting synergy among resident and non-resident stakeholders of TECNOPUC. Both initiatives are integrated, adhering to the same purpose: the promotion of collective intelligence and sustainable growth beyond the borders of TECNOPUC's Ecosystem.

INTRODUCTION

In a twenty-first century context and in a society focused on knowledge creation from inter- and transdisciplinary initiatives, the Science and Technology Parks are recognized vectors of sustainable development based on knowledge and innovation. Searching for permanent leadership, the Pontifical Catholic University of Rio Grande do Sul (PUCRS) inaugurated its Scientific and Technology Park (TECNOPUC) in 2003, introducing an innovative plan, strongly dedicated to the promotion of technology-based startups, spinf-offs and mature companies.

After thirteen years of rapid growth, this initiative, anchored on three global companies (HP, DELL and Microsoft), transcends the context of an isolated action and represents a true Innovation Ecosystem. According its seminal taxonomy, an ecosystem is composed of multiple organisms, with organic growth, largely flexible and adaptive capacity. Currently, TECNOPUC has two sites, occupying an area of more than 80,000 sqm. It brings together over 120 companies and innovative mechanisms, as well as more than 6,400 employees, including entrepreneurs, technicians, professors, researchers and students. Their actions are aimed at increasing the competitiveness and the differentiation of its actors, providing society with PUCRS' academic excellence; ratifying the University's mission beyond the dimensions of teaching, extension and research. Therefore, there is in this context a fourth dimension, focused on innovation and development in order to transform and improve the society's quality of life.

The following are the main objectives of TECNOPUC:

- attract business to encourage applied, scientific research;
- promote the creation and development of technology-based companies;
- stimulate innovation and the interaction government-industry-university;
- promote synergy and networking activities, both internally and externally;

TECNOPUC is characterized by having a multidisciplinary approach, focusing on the areas of:

- Information and Communication Technology (ICT);
- Energy and Environment;
- Life Sciences;
- Creative Industry.

In this sense, the TECNOPUC efforts converge to seek and provide changes in the way society works, contributing to the development and generation of wealth. According to Pierre (1997)¹, the consciousness of man's transformation of power and of the information society leads to what is called today Knowledge Society, where the productivity factor, distinct from previous Societies (Agricultural and Industrial) it is centered on knowledge, intangible assets and production. To this dimension, one can add innovation as a strategic guideline that searches development through science, market, and its experimentation, promoting the generation of new, value-added products, processes and techniques. Innovation thus becomes the main vector for ensuring the development and sustainability of the ecosystem and its surrounding region. The knowledge society has knowledge and innovation at its basis. Knowledge is in the application or use of contextualized and critical information aiming at a certain goal. Innovation, product or process, comprises a set of actions such as the search, discovery, experimentation, development and adoption of new products, processes or techniques to add value in a given context. Usually innovation is related to, the breaking of a paradigm, and brings out a strong component of change. It is this change, generated by innovation, that creates the need to develop increasingly agile and flexible learning mechanisms, allowing it to offer the Ecosystem stakeholders a strong competitive potential. In this sense, the knowledge society requires new management tools and mechanisms to generate the conditions for developing environments and actions conducive to innovation and learning. This ability to learn and innovate is the major competitive advantage that will determine the sustainability of organizations in the future.

¹ LÉVY, Pierre. L'intelligence collective: pour une anthropologie du cyberspace. Ed. La Découverte, 1997.

There are two initiatives currently supporting these strategic action plan, both convergent and with a high degree of complementarity. On the one hand there is the GLOBAL TECNOPUC, made tangible by a new building on TECNOPUC central campus in Porto Alegre, with the proposal to be a convergence hub by sharing actions, co-creation and collaborative work in its various dimensions. On the other hand, there is the SRM Program, with its preparation and development of methodology in order to encourage the synergy among the stakeholders of TECNOPUC's Innovation Ecosystem. The process is primarily focused on the ability to identify existing capacities and needs and promote the relationship between potential partners, generating new knowledge and assets for people and businesses

The following sections in this article attempt to describe these actions. In Section 2, we describe the pioneering implementation of GLOBAL TECNOPUC, at national and international level, based on its four dimensions of analysis. In Section 3, the object is the SRM program, its theoretical basis, objectives, the proposed scope and the phases implemented to date. In section 4, we present the timeline for actions, defining goals and results to be achieved.

All these initiatives are integrated, allowing for the collaborative planning of objectives and implementation of the proposed scope. The GLOBAL TECNOPUC & the SRM PROGRAM can effectively provide sustainability for growth beyond the physical space available today to another space of other forms of relationship, offering innovative mechanisms for all stakeholders - residents and non-residents - linked to the TECNOPUC innovation Ecosystem.

GLOBAL TECNOPUC

Currently, referring to TECNOPUC- is something like referring to an organic, flexible, highly adaptive system, emerging clearly identified as an Innovation Ecosystem. TECNOPUC's rapid growth in recent years changed it into an evolving ecosystem. Its parts necessarily make up a whole and this is how it should be seen: as members of the same body.

TECNOPUC participates in this scenario as the main vector for innovative companies, so that start-ups and spin-offs can give their first steps towards the market as much as external, intensive companies in knowledge can seek access to innovative environments and differentiated intellectual capital. It is in this context that we present the GLOBAL TECNOPUC, a new 'link' that offers to enhance and propose new, bold, and potentially innovative, pioneering initiatives.

The GLOBAL TECNOPUC Project (IASP World Conference Proceedings, 2015)² has as its broad objective to implement a new locus in order to encourage innovative and creative actions, integrating in one place initiatives for various audiences - internal and external - as a way to increase synergy for the incubation of new ideas and new projects based on knowledge and innovation.

Among its various lines of action, the GLOBAL TECNOPUC has the following goals:

- Encourage inter- and transdisciplinary activity and entrepreneurship;
- Create an environment that will foster increasing synergy between the multiple stakeholders of TECNOPUC;
- Generate new opportunities and new businesses;
- Increase the links of the University with the Companies;
- Consolidate TECNOPUC as vector of development based on research and innovation;
- Attract new stakeholders for investment in RD & I projects;
- Encourage the establishment of new collaborative networks;
- Encourage the development of new innovative proposals;
- Encourage innovative actions, based on the acceleration of synergies between stakeholders, to expand opportunities for innovative projects - (please refer to the Strategic Resource Mapping - SRM in Section 3).

The GLOBAL TECNOPUC - Center for Innovation, Creativity and Networking aims to provide a competitive advantage to expand the scope of the initiatives, so far implemented in different phases in order to ensure its continued growth. The different phases are listed below:

² 2015 IASP WORLD CONFERENCE PROCEEDINGS, 32nd 2015, Porto Alegre. **The Global Dimension in Science and Technology Parks: The Case of TECNOPUC.** Beijing: Iasp, 2015. 505 p.

Phase 1:

2003 - Inauguration of the Technological Park of PUCRS;

Phase 2:

2010 - Inauguration of TECNOPUC Portal, 99A Building;

Phase 3:

2011 - Inauguration of TECNOPUC Viamão, as a second site, 2011;

Phase 4:

2015 - Inauguration of GLOBAL TECNOPUC, a Center for Innovation, Creativity and Networking, considered as innovative both for its spaciality and the interconnected functionality of its multiple activities.

The built space, with more than 4,000 sqm, is presented as a spatial representation of a set of actions, the tangible realization of environments that should be filled with a vision of the future, offering content and sustainability, innovation, creativity and construction of a new social network. The building is composed of a common area, at ground floor level and two vertical towers, the Einstein Tower and the Da Vinci Tower, making its concept tangible from recognized names that changed the conception of the world beyond their own time.

The GLOBAL Tecnopuc offers unique spaces to promote collaborative actions among people with diverse knowledge and interests, based on its overall dimension: innovative environments, flexible designs to enable rapid reconfiguration of spaces and promoting greater interaction and opportunities for new projects. The spatiality of the new building has arranged environments in different floors, which will not necessarily configure the distinction of its features, but will lead to integration, offering its users the perception of new horizons from the wealth of intellectual capital available in the PUCRS' innovative Ecosystem; either by the synergy between the actors that make up the business and the innovation park staff or by the close relationship with all the society that surrounds it. In addition, there are four dimensions to be incorporated in this ingenious proposal:

- 1st: Living Together
- 2nd: Networking
- 3rd: Open Innovation and Creativity
- 4th: Coworking and Internationalization

The 1st Dimension is related to Living Together. Currently, many of the facilities offered to TECNOPUC stakeholders are exclusively on PUCRS Campus, externally to the physical TECNOPUC space. This offers a complementary look of TECNOPUC contributors to the University; however, it inhibits the creation of multiple networks within the park environment, supported by these and other facilities not available in the whole infrastructure of the university campus. Some are cited below:

- Reception Lobby: features a permanent invitation to interactivity, with visual permeability to its external environment and an outside sundeck;
- Covent Garden Area: features a cafeteria in an open and flexible environment, incorporated into an exhibition space and leisure spaces allowing for exchange of experiences and ideas;
- Cultural facilities: bookstore and newsstand;
- Services: pharmacy, post office, ATMs;
- Spaces for investment agencies and promotion of entrepreneurship;
- Auditorium Hewlett-Packard, with complete infrastructure for multimedia and video conferencing;
- Delphos: outdoor arena for 200 people, to hold open and cutting-edge activities.
- Innovation Space: offers contemporary CTI tools for presentations of member of TECNOPUC Innovation Ecosystem, as well as a recreational area, for all collaborators;
- Development Space: exposure of a Timeline dedicated to Innovation, involving the creation and development of TECNOPUC from his first seminal shares up to the present day, at the regional, national and international levels.

The 2nd dimension offers various and diverse environments dedicated to Networking. They are areas to house actions of various kinds, individual or company-oriented, creating and demanding the convergence among multiple actors. It represents the flow of entry, stay and exit of different looks on innovative objects. It seeks to connect the various actions available in nearby environments, providing instruments for externalization of tacit knowledge. In this context, spaces for Networking should include: communication, multipurpose and multifunctional rooms with collaborative tools; space for business, professional or institutional associative entities.

The 3rd Dimension focuses on Open Innovation and Creativity, offering available spaces for temporary use for incubation of state-of-the-art projects and ideas. These are adjusted to demands maximizing prototyping and verification of new concepts, still in early stages and that may be the subject of new projects and businesses. They are flexible and temporary spaces, in partnership with the University and its academic initiatives, with a wide services infrastructure and tools available. This dimension shelters the Creativity Lab (CriALab) in partnership with HP and HPE companies, with spaces dedicated to teamwork, sharing and co-creation of ideas, stripped of traditional processes. It's a new space and a new perspective of action and innovation. It is anchored in virtual environments, collaborative platforms and new organizational working relationships that transcend aspects such as place and time to be realized.

The 4th Dimension houses the implementation strategy of a Coworking space directly integrated with the strategic actions of the TECNOPUC Internationalization Program. It is an invitation for new stakeholders (individuals or companies), for temporary occupation of physical space, focusing on the development of products and services for the global market, including Soft Landing initiatives currently being developed with global partners. It is open to national, international, consolidated or new companies that share same focus, expanding the opportunities for the intellectual capital available at PUCRS/TECNOPUC and its surroundings.

The induction and motivation to use the GLOBAL TECNOPUC are based on a strategy to permeate the attitudes of their managers, in order to ensure the deployment of innovative equipment and additional to the ones currently available. Adding value to this freedom of use by the community and society, some activities should undergo a prior selection process. In this context, the priority spaces for incubation projects and ideas, the CriALab and the Internationalization Program must meet prerequisites, summarized below:

- analysis of the potential for adding value to companies and entities involved, in terms of generating new employment opportunities and income;
- identification of the focus of interest and its scientific area, aligned with TECNOPUC's areas of expertise;
- evaluation of the demands and structures offered by GLOBAL TECNOPUC;
- establishment of an action plan, identifying objectives, methodology, necessary resources, evaluation indicators and expected results.

All these experiences linked to the performance of GLOBAL TECNOPUC should be subject to permanent documentation with a view to refining and improving these activities, and should integrate a repository of knowledge. This repository will be made available to the community, and thus fed back continuously and systemically.

The Global TECNOPUC, inaugurated in October 2015 and open to internal and external audiences, is already recognized as an attractor center of ingenious and creative activities, stimulating the collective thinking. There is a growing demand for its spaces, above initial expectations. Activities relating to the ecosystem, the University or external organizations have positioned this initiative as of high value, for it is based on knowledge, innovation, development and entrepreneurship. Since this initiative as a whole aims to set up a center of convergence of new actions and ideas, the development of a robust program for sharing and collaboration becomes critical. In response to this strategic action, there is a new element to the Global TECNOPUC strategy: the development of project whose purpose is to generate synergy among the multiple actors of this Ecosystem. This initiative is in full development since 2014 and is the Strategic Resource Mapping Program (SRM), described in the next section below.

SRM - STRATEGIC RESOURCE MAPPING PROGRAM

The organic growth of TECNOPUC, along with the permanent use of new mechanisms for promoting innovation, have increased the prospects for pioneering actions. One of these is the creation of a mapping project to promote a more intense sharing and collaboration environment between TECNOPUC companies. This project is known as Synergies Acceleration Project (Strategic Resource Mapping - SRM). The overall objective of this initiative is the connection between companies, people and knowledge, processes and services, seeking to enhance actions aimed at innovation, research and development under the tutelage of analysis and management tools.

This project aims to increase the transparency and visibility of resources (strengths and weaknesses) of the companies in the TECNOPUC Ecosystem. This will enable and empower (1) the faster creation of an internal market for products and services; (2) the increase of the possibility of collaborative development of cutting-edge projects; (3) the better sustained growth of the ecosystem offered to resident as well as non-resident companies.

Among its main objectives are the following:

- Create an internal market for goods and services;
- Leverage the joint development of new solutions and business;
- Increase investment indicators
 - Internal: among the ecosystem companies
 - Abroad: Investment funds and venture capital
- Improve interaction with external stakeholders, the ecosystem and the University
- Promote actions for sustainability in the short, medium and long term

The methodology consistently and reliably supports the creation of opportunities to stimulate the internal market in goods and services, facilitating shared development between companies, and allowing for cross-investment. The purposeful acceleration of these synergies seeks to grant action not only in areas where the innovation ecosystem already operates, but also to act as an indicator of new potential to fill skills gaps. Additionally, it acquiesces the attraction of new enterprises convergent with the Park's strategies, enhancing sustainable growth beyond its borders, allowing member companies to operate from a perspective of inclusion in the ecosystem, despite being based outside its premises.

Consequently, the connection capacities of one or more companies with the needs of another enhances the identification of actions under a modern management strategy. The existence of a structured way to search the identification of skills and existing demands of all these companies in the park generates new avenues for innovation and development, offers services with high added value and increases the chances of more companies to find partners and collaborators, being positioned inside or outside the physical limits of the ecosystem.

The promoted synergy is tangibilized by the fact that stakeholders can take advantage of stronger connections with each other, providing opportunities that the information generated by the project may also be used in a self-service manner, or conducted and induced by the TECNOPUC Coordination of Projects and Negotiation area, as an effective managerial tool.

The establishment of a new culture of exchange and sharing of information and knowledge helps the identification of relevant aspects of organizations and highlights opportunities for new products and services, allowing for an efficient mapping to implement integrated actions and promote the execution their strategies in the economic, social and human areas.

To achieve these results, it is necessary for the ecosystem - its stakeholders and employees - to commit with the activities promoted internally and in the community around them, as well as try to giving back the same opportunities they experience and sustain their business and lives. The connection of the capacities and needs of businesses are presented as one of the best vectors for innovation in the pursuit of business success. As a result to be achieved, it is necessary to foster the the alignment of organizations and their increased visibility for permanent disclosure of their abilities and needs.

For the ecosystem in general and for the management of TECNOPUC, particularly as organizations can share the same environment and higher levels of knowledge, they can therefore generate

greater benefits for its customers in regional, national or even global level. Among some tangible results, it is now already possible to mention the valuation of a greater synergy between the companies established in the ecosystem, the importance of collaborative and shared processes, and continuous updating of their skills and demands.

Audy and Knebel (2016)³ claim that “innovation reaching the Market through products and services stems from interaction among individuals and smart applications of their talents. People and knowledge are the main drives for innovation; hence the development of new mechanisms to scale this potential exponentially”.

In sum, the Acceleration of Synergies Program (SRM) is directly connected with GLOBAL’s strategies, which is the place for interaction for all those in TECNOPUC. Concepts such as collaboration, co-creation, sharing of ideas and actions form a truly efficient network.

For the development and implementation of the SRM project in TECNOPUC, its theoretical basis and its initial proceedings were supported by a set of actions, as well as its convergent relationship with GLOBAL TECNOPUC as a broader and more comprehensive project, namely:

1. Identification of sets of skills and needs of selected companies and project participants;
2. Development of a measurement tool and support for the collection of data related to the capabilities and needs of companies;
3. Identification and analysis of the most relevant areas and existing gaps;
4. Development of an approach to reach stakeholders
5. Allocation of resources and investments, aligned with the ecosystem strategic plan, in order to promote and generate a higher level of technological innovation and sustainable growth.

Many are the authors and researchers who corroborate these initiatives in their concept and form. Membership in the network provides economies of scale because companies start ahving, among other advantages, greater bargaining power with its suppliers and partners (CAMPBELL and Goold, 1999)⁴; they are more likely to generate brands with high recognition, and achieve greater amplitude on public display (LORENZONI and Baden-Fuller, 1995)⁵. By participating in a network, companies are perceived more distinctively in their area, as well as receive more credit and recognition by the public, ensuring greater legitimacy in corporate actions and resizing the importance of the company in its institutional context (DiMaggio & Powell, 1983)⁶. In addition, there are possibilities for fruitful establishment of relationships with universities, major suppliers and government agencies, factors that small businesses sometimes cannot establish (HUMAN and Provan, 1997, p.383)⁷.

Competitive gains for companies, with reference to the construction of qualified and collaborative relationship can be illustrated as follows:

1. Scale and market power - the more the better;
2. Access to Solutions - services, products and infrastructure (marketing, prospecting opportunities);
3. Learning and innovation - sharing ideas and experiences; innovative nature of actions jointly developed jointly by the Park companies;
4. Reduction of costs and risks - cost sharing between the parties on common activities;

³ Audy, J. & Knebel, P. (2016). Tecnopuc: PUCRS’S Science and Technology Park: people, creativity and innovation. EDIPUCRS.

⁴ Campbell, A., & Goold, M. (1999). The collaborative enterprise: why links across the corporation often fail and how to make them work. Reading: Perseus Books.

⁵ Lorenzoni, G., & Baden-Fuller, C. (1995). Creating a strategic center to manage a web of partners. California Management Review, 37(3), 146-163.

⁶ Dimaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: institutional isomorphism and collective rationality in organizational fields. American Sociological Review, 48(2), 147-160.

⁷ Human, S. E., & Provan, K. G. (1997). An emergent theory of structure and outcomes in small-firm strategic manufacturing network. Academy of Management Journal, 40(2), 368-403.

5. Social Relations - growth and sense of belonging beyond the purely economic view.

In this context, the SRM Program generates new valued offers to the stakeholders and employees of the ecosystem. They are summarized as follows:

- training methodology, consolidation and expansion of 'synergies' between companies;
- support structure for the implementation of the SRM Program;
- coordination of management under the responsibility of TECNOPUC.

IMPLEMENTATION STRATEGIES

Considering that the concepts that underpin the actions of the GLOBAL TECNOPUC and the methodological perspectives of the SRM program aim at ensuring a differentiated growth, there are a number of objects to be achieved from well-defined strategies.

The consolidation of these actions create a more robust internal market for goods and services; leverage the shared development of new solutions and business; increase and order investment levels; qualify the interaction between the Park businesses - residents or non-residents - and promote long-term collective thinking through sustainable actions. Therefore, strategies are based on activities such as the formation of the so-called Working groups - henceforth WG - by area of expertise, aiming to starting the preparation for collaborative work to cope with the market demands. One example is the formation of the WG in the area of electric energy, dealing specifically with the generation, transmission and distribution of electricity and preparing suggestions for future government investment policies. Another strategy is the Tecnopuc open doors, with the goal of getting companies to know each other - from inside. One (or more) companies will open their doors to receive other companies who want to know them. Non resident companies and associations may also be involved in projects and activities as an associate, consolidating the culture of synergistic and collaborative projects. A non-resident associate may participate in the SRM Program and also take the advantage of the GLOBAL TECNOPUC infrastructure, stimulating the exponential growth of the ecosystem.

FINAL THOUGHTS

This article is a reflection about the importance of collective and synergetic actions. It is based on the concrete foundations of a successful experience in South America and has been recognized two times as the best Science and Technology Park of Brazil. Its current initiatives, GLOBAL TECNOPUC and SRM Program project puts effort in new, changing, and sustainable growth for partner companies in or outside of TECNOPUC. Both actions focus on knowledge and collective intelligence. They adopt physical spaces that foster innovative assets, attract talents and promote new actions among the multiple actors that make up this Innovation Ecosystem. The SRM Program has already being recognized in 2015 as the third best solution in the IASP Inspiring Solution Programme, a knowledge sharing initiative that recognizes excellence within the world of science parks and areas of innovation.

The results already achieved, the fostering of creativity, the prototyping of new concepts, the greater synergy between entrepreneurs focused on their capabilities and needs, suggest that in the medium and long-term plans, the results will expand the outreach of this Ecosystem. This approach will foster sustainable growth, will mitigate the risk of encapsulating TECNOPUC to its physical boundaries, provide the participation of companies and non-resident organizations and keep the same concepts that enable a close relationship with TECNOPUC innovation mechanisms. Finally, the positive development of these initiatives make a long-term, sustainable and innovative vision possible, even in a time when emergence, complexity and interdisciplinarity suggest new paths which converge with the challenges proposed here.