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The peopleware, software and hardware triad: a strategy to create and evaluate innovation spaces

Parallel Session 1
"Future-proofing our space"

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This paper reports the case of a creativity laboratory - CriaLab - dedicated to develop creative autonomy and creative confidence in people. CriaLab is the result of an innovation strategy between PUCRS and HP, one of the companies installed at PUCRS' Science and Technology Park, TECNOPUC. This strategy's main advantage is the funding and the promotion of a place outside the official company's site (but inside Tecnopuc) made to flourish: a place for collaboration and connection. We present the view of a relationship network between STPs stakeholders aimed to nourish the laboratory and the founder company, as well as a framework for creativity labs in STPs that considers peopleware, software and hardware as assets.

Keywords: *innovation strategy, creativity laboratory, creative workplaces, STP.*

1 INTRO

STPs are planned areas to foster innovation through collaboration between university, companies and government. These areas demand complex structures to encourage innovation processes based on creativity and interaction between actors from that given ecosystem. At the same time, inside organizations spaces are specially designed to support employee's creativity, with the final goal of increasing their capacity to innovate. One example is Tecnopuc, the Science, Technology and Research Park located on the campus of the Pontifical Catholic University of Rio Grande do Sul (PUCRS), Brazil. It is one of the most highlighted STPs in Latin America, hosting more than 120 organizations and 6.300 job posts. It is a place where professionals, students and research collaborate in coworking spaces, coffee shops and events.

To strengthen the park's innovation ecosystem, the Global Tecnopuc - Center for Innovation, Creativity and Networking - was inaugurated in 2015. Unlike the other buildings in the park, Global was not built to house businesses, but to be a networking point with the potential to engage actors of all dimensions in the four-helix propeller: university, business, government, and society. The Global Tecnopuc is composed of two towers interconnected by a coworking space, an auditorium, exhibition hall, flexible classrooms and meeting rooms, games room and CriaLab - Creativity Laboratory. The building's ambience was thought to inspire visions of the future and promote social networking.

This article aims to present CriaLab,Tecnopuc's Creativity Lab. CriaLab was designed to stimulate creativity in the Technology Park as one of the essential foundations in the development of innovative projects. More than searching for new inspirations, it became evident to structure forms that would rescue the creative impetus in people. It is known that this characteristic is well developed in the period of childhood; however, the formal learning methods are suppressing the individuals' freedom of expression, through the fragmentation of knowledge and a fixed mindset[61], related to avoiding challenges and risks, negative feedbacks and see others' success as a threat. Changing this process with a broader view is a challenge for organizations, because the fixed mindset makes it difficult to think outside the box.

[61] DWECK, C. Mindset: The new psychology of success. New York: Random House, 2006.

CriaLab is, as expressed in its manifesto, an experimental laboratory on creative process, a space of permanent change focused on constructive interactions. We believe in cooperation to help us explore different ways to see the world. We rely on interdisciplinarity to speed up the creative process and deal with complex problems. We seek the development of people's creative autonomy and co-create a unique system that strengthen creative actions. For us, problems are understood beyond solutions. Our method of operation is people centered, specific for each context, focused on the understanding of the problem and geared towards innovation. This poses a challenge.

Considering this challenge, CriaLab sought to find elements of psychology, sociology, anthropology, education, semiotics and design to inspire the elaboration of an action strategy that would break up with the dominant status quo, seeking to rescue that "creative child" in each individual and inviting him or her to experience such opportunity. What is the foundation for such boldness? The need to promote innovative actions, attitudes and results to the organizations and the university, who constantly need to renew their way of acting and serving a society that is more demanding and eager for novelties with high added value.

CriaLab is an environment of transformation and constant questioning, where the dialogue between theories and practices are in permanent debate. People, institutions, lines of interdisciplinary thinking, theoretical postulates, strategies of action and experimentation are essential components in the search for exploration of increasingly complex, broad and systemic problems. Potential relevant and effective solutions arise from this permanent interaction and iteration between people, processes and the environment. CriaLab provides services to companies, governmental and non-governmental organizations and the university, thus reaffirming its convictions and reinforcing its sustainability model, seeking to bring value to this heterogeneous public. This hybrid model allows a space more prone to open innovation processes, nurturing collaboration and connection with different perspectives and disciplines.

The main guidelines for this initiative were supported by research considering benchmark, world-reference innovative places, theoretical frameworks and interviews with specialists from many areas of knowledge. The research were used to create the operational model and to guide the design of CriaLab's physical space, which was conceived to cater for the demands of the creative process.

In the next session we introduce the operational model of CriaLab, describing its scope of work and interactions with companies inside and outside Tecnopuc and with different sectors of the university. Afterwards, we present a framework for spaces of creativity that consider the relationship between three domains: processes, people and physical environment. Finally, we briefly reflect on the potential for project exploration and development in a dynamic and interconnected innovation ecosystem.

2 CRIALAB'S OPERATIONAL MODEL

Nowadays, nearly everyone agrees that innovation is the way to nourish an organization towards its growth. The ability to see new opportunities and harness resources to pursue them is a fundamental advantage for any organization.

At Tecnopuc we've been witnessing a growing number of companies turning its physical working spaces into creative spaces, establishing innovative ways of working and getting more from their collaborators. These creative spaces prioritize differentiated furniture and space layout.

We state that a creative physical space by itself is not enough to nourish innovation in an organization, even if this organization is placed in a successful and vibrant STP. A broader strategy is needed to have a big step towards innovative results.

Inside CriaLab we develop concepts, prototypes and conduct user research and demo evaluations. We also offer creativity and design thinking workshops. We have our own team with our own culture pursuing different values and processes. At the same time, CriaLab's team has at its disposal technical expertise and organizational resources from companies and from the university.

In this model of operation, the company: (1) has a neutral field for user research without compromising the confidentiality of its projects; (2) has a physical space and a qualified team to assist its project teams and other collaborators; (3) benefits itself from the other initiatives that happen in the space, oxygenating its internal practices.

CriaLab team is part of PUCRS' technical staff, managed by AGT (Technology Management Agency), which acts as facilitator in the University - Company - Government interaction process, stimulating and enabling the development of Research, Development & Innovation (PD & I) reconciling the market needs with the knowledge existing in the university. AGT identifies and consolidates possible partnerships and enables the bureaucratic part of the projects, including the relationship with service providers.

CriaLab's work is based on three forms of operation:

a. Facilitation: Convergence of the understanding of large groups for problem solving and scenario building. Through workshops we facilitate communication, the generation of ideas and the consolidation of achievable actions. Much of the demand for this type of service is carried out by the companies' Human Resource areas, avid to give new impetus to the innovation of their organization, or to validate a strategic decision-making with big groups.

b. Training: Methodologies and practices of creativity, design and innovation processes. We encourage the development of an innovation culture in organizations and teams through training programs and courses. In this case, organizations seek CriaLab to maintain innovative phlegm in their processes, allowing its collaborators to learn new and active methodologies that become part of the way they operate. Therefore, companies can seek greater autonomy in their daily lives, through this empowerment, developing new soft skills to take on more complex challenges and greater added value.

c. Projects: Given the prominent technical nature based on design, CriaLab works in the direct development of products, services and experiences, preferably in co-creation with contracting clients. Hence, projects guided by empathy, collaboration and experimentation are carried out. The laboratory develops user surveys, product concepts, services and experiences, provide guidance and project requirements. At the end of the projects, we deliver dossiers with records and considerations on the entire project pipeline.

Based on the assumption that the knowledge (explicit and tacit) that permeates an organization can be underutilized, mainly due to lack of alignment and communication of stakeholders, CriaLab seeks to stimulate useful information management, providing a better flow of shared knowledge internally and externally, guaranteeing the generation of greater added value to the organization. In this sense, CriaLab develops activities designed specifically for each demand, according to the identified needs, tangible through the production of detailed reports of the historical flow of the entire process, including the preliminary negotiation phase, alignment of expectations, contracted service / partnership, definition of the actuation strategy, actual performance, analysis of the results experienced, lessons learned and suggestions for future work. This way, CriaLab guarantees total transparency in the processes and wide socialization of the results to all the pre-defined stakeholders who can benefit from this work.

Besides working for HP, our sponsor, we work for several other companies (both inside and outside the Park). One of these companies, DBServer, an IT company installed in the park, is our client thanks to a park model that supports the interaction between companies and the university. This model predicts that the companies installed in Tecnopuc should give a counterpart to PUCRS when using the space through investments in research or other university services. This counterpart is proportional to the size of the place the company occupies. Thus, there is a fostering of research and partnerships with the academic units and university sectors, generating knowledge that goes beyond institutional boundaries, capable of benefiting the society. University students may have the opportunity to work in companies such as HP, Dell, Microsoft, Apple, Thoughtworks, Totvs, Stefanini, Accenture, among others, having contact with the market while conducting academic research.

Our work on this model with DBServer began in 2015 with two workshops introducing the company directors and project managers to the practice of design thinking. Since then, DBServer decided to invest more in the partnership and increase its counterpart to CriaLab (besides the laboratory, the company has partnerships with the computer and communication faculties). Today we work daily in the company offering workshops with general themes on creativity and design for both the staff and clients of the company; we also help the company and its teams to improve their internal processes through research and facilitation for the understanding and convergence of knowledge.

This model differentiates Tecnopuc from most of the other parks, which operate independently from the university, and is a way of stimulating work between company and university. However, we still face some

challenges: many academic researchers are not comfortable with the pace of work demanded by the market, especially the need to generate results that add value to their interests. On the other hand, many Brazilian businessmen still have difficulty understanding the value of having a researcher within their company, bringing all the rigor and analytical density that qualifies their results, transferring greater credibility and consistency to the market in which they operate. In this sense, the incentive becomes even more relevant for society, since researchers experience contact with the market in a protected environment and the companies installed in the park already reap the fruits of partnerships with academic units of the university, qualifying their earnings.

To exemplify such a symbiotic relationship between academia and the market, it is pertinent to describe the other kind of partnership between HP and PUCRS. Both run the LIS (Software Innovation Lab), a laboratory located in the Computer Science School, that counts on teams of senior graduates or masters and doctorate researchers, contracted by PUCRS. These students are assisted by HP managers and technical leaders while conducting technology development projects. The beginning of CriaLab's work in HP projects was precisely in this type of partnership arrangement, when CriaLab's collaborators advised LIS teams through the development of creative process workshops that complemented the technological development projects.

In addition to companies as customers, we also provide service to the university and its different units. Several university sectors benefit from our workshops and facilitation activities. For example: With PROEX (Vice President's office for Extension and Community Affairs), we held an event to welcome all new students and to understand what they expected from their lives at the university. At the time, we mobilized over 2000 students from all undergraduate courses. With PROACAD (Vice president's office for Academic Affairs), we facilitate the convergence of knowledge to think about the new School of Humanities, the Business School, undergraduate courses in Physical Education, Nutrition, Physics, Pedagogy; together with ASCOM (Office of Communication), we assist in the conception of a new management model; With PROAF (vice president's office for Administration and Finance), we use service design techniques to think about new forms of internal financial processes.

Every year, we are invited to hold workshops in teacher training seminars that seek to innovate in teaching practice, varying in groups of 30 to 120 professors from the University. Our workshops have already covered topics such as design thinking, creative classroom methods, and instructional design for teachers.

We are currently working with the Pastoral and Solidarity Center, the sector responsible for voluntary work at PUCRS. The greatest interest lies in the consolidation of a Solidarity Network that will have a significant impact on society by attracting more volunteers among professors, administrative technicians and, above all, students and training interns (freshmen, senior, undergraduates, graduate students).

Considering all those who have been attending CriaLab, since the inauguration of its current headquarters on April 28, 2016 until March 2017, about 4437 people, of whom more than 72 are foreign, have already passed and experienced some activity / event on their premises. In addition,

the CriaLab team has already impacted more than 90 people overseas, in Houston/TX (USA) and Nürnberg (Germany).

People who attend CriaLab and participate in our workshops are always impressed by our favorable structure and claim that the CriaLab space favors creative thinking in a differentiated way. However, we always seek to emphasize that the space is only an enabler, and that the most important thing is the people and the processes they undergo. People must be open to experimentation and collective learning and must constantly reflect and evaluate processes, as methods and approaches reflect thought patterns.

Although we have a differentiated, prone to the creative process and out-of-the-box thinking, our major pillars are people (as propellers of new mindsets and ways of living and working) and processes (such as approaches that enable diverse ways of thinking so that innovations in the final product can occur). With this idea in mind, CriaLab's physical space was created: from a systemic view to the intersection between peopleware, software and hardware to promote the creative process. This perspective considers the physical space as part of an engine in which innovation happens during specific interactions between people, processes and environment. In the next section, we present these concepts in the format of a framework.

3 A FRAMEWORK FOR STP'S CREATIVITY LAB SPACES

There are several representations of the creative process in the literature, some more complex, like the model proposed by Seelig[62] (2012) and others more elementary. CriaLab has adopted people's ability to observe, reflect and do as a methodological guideline, according to Figure 1. Through this model, we believe that we can develop fundamental externalities that boost the creative power of people in a collective, systemic and consistent way. As the process progresses, it generates exploratory and ponderative pathways. This movement is continuous and incremental, inspired by the knowledge spiral proposed by Nonaka and Takeuchi[63] (1995).

[62] SEELIG, T. InGenius. A crash course on Creativity. San Francisco: HarperOne, 2012.

[63] NONAKA, I.; TAKEUCHI, H. The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation. New York, NY: Oxford University Press, 1995.

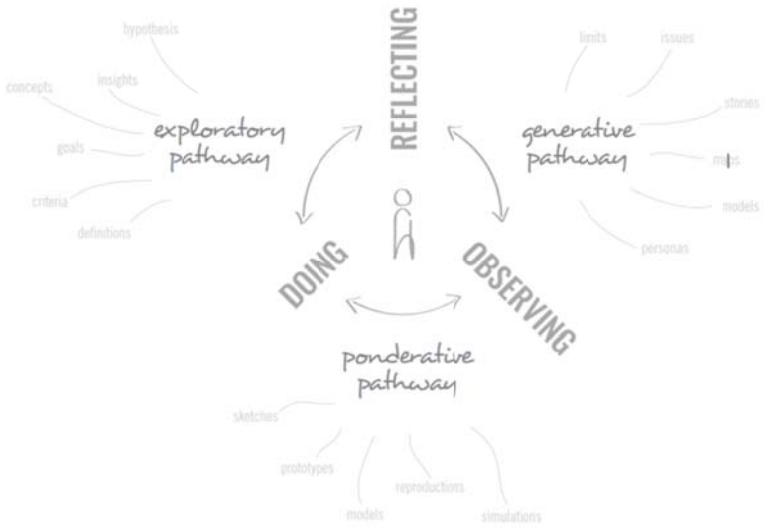

FIGURE 1: Creativity engine

By the middle of 2014 until the end of 2015, HP sponsored a consistent investigation of processes and creative environments around the world, in order to better support the architectural design that would identify and justify the ideal spaces for a creativity lab. We realized that there is more than just the physical space involved in the design of a creativity environment. The triad of software, peopleware, and hardware, already used in the early days of the lab's foundation in 2008, helped us think about space related to two other fundamental elements: people and processes. We use a Venn diagram to explore these intersections, as shown in figure 2.

FIGURE 2: Peopleware, Software and Hardware exploration.

This type of diagram represents different sets and explores the possible relationships between them. We call each domain set (People, Processes and Environment) and name its intersections (Legacy, Baits and Devices). We went from a triangular scheme with simple relations to a framework that inspired a broader exploration of the concept of creativity applied to complex and interdisciplinary projects.

The framework understands spaces that stimulate creativity as systems that must take into account people passing through specific processes that happen in an environment and the influences of this phenomenon in the daily life inside any organization. Focusing on this perspective, from debriefing sessions after workshops and project sprints, we are constantly evaluating the impact of actions taking place in CriaLab. Thus, the diagram serves as a guide to reflect on how these three elements interact and influence each other.

Regarding the Peopleware domain, we turn our attention to Csikszentmihalyi's[64] (2008) concept of flow, described as a state of complete absorption and enjoyment in an activity, called optimal experience. During the flow, the person lives an experience of awareness and immersion that has an end in itself and is guided by intrinsic motivations, while at the same time in alignment with personal goals. Every flow activity provides an experience of experimenting another states of consciousness. The experience should be designed to lead to growth and discovery, avoiding boredom and anxiety through the awareness of the challenges and skills present in an activity, although this outcome depends on the personality of each person involved.

The experience of people in this space must foster and qualify human relationships, to the point of developing a community of creative practice. Because our repertoire is one of those responsible for the results of our creative process, we must offer ways to enrich it.

The People's domain is determinant and moves all elements of the framework. Everything begins and ends in people, who are vectors of transformation and propagation of culture. While experiencing the creative process, people can be guided by methodologies and models that help them to follow the path, a process that is much more meaningful than the definition of the solution itself, which, due to the exponential advance of knowledge and the resulting technologies, is configured as mere transience to larger and more relevant challenges.

Each of these phases allows for creativity to manifest itself in different ways. To explore the maximum of these dimensions, it is important to be aware of the process and to experience different methodological tools. This is where the Process domain begins. It answers the question of *how* a given experience occurs, suggesting a style to walk a path and meet a challenge. They are supports such as methods, approaches, tools and procedures.

[64] CSIKSZENTMIHALYI, M. Flow: The psychology of optimal experience. New York: Harper Perennial, 2008.

The pioneering study on the influences of the physical environment on brain plasticity was published by Bennett et al.[65] (1964). The team of scientists studied the behavior of 36 rats for 30 days, divided into three different environments: 1) enriched; 2) normal; 3) depleted. The enriched environment was called "Disneyland" for mice, with room to move freely and scattered toys. The results indicated that the brains of rats from the enriched environment differed from the brains of depleted mice in different ways. The cortex of the enriched mice became larger and heavier (the cortex is the part of the brain that responds to experience and is responsible for movement, memory, learning, and the 5 senses). The neurons of the environment-enriched rats were also larger, which meant that there was a higher level of chemical activity. When the experiments are replicated, the same pattern of differences is repeated. Finally, the synapses of the enriched mice were 50% larger than the others. A synapse is the point where two neurons meet and where most of the brain activity occurs.

Extrapolating this study to what happens in the human brain, it is perceived that the cerebral cortex, associated with most cognitive processing, is the part of the brain most influenced by enriched environments. This indicates the peculiar cortex plasticity, which changes its micro-organization throughout a person's life according to their experiences, impacting on human behavior and learning.

In the animal world, this hypothesis, called enrichment, has already been corroborated through widely repeated controlled experiments with rodents, birds and mammals. Experiments with human tissue were conducted and also supported data from animals. It can be said that the widely studied concept of brain change in response to enrichment is valid for several species of animals, including humans[66].

Since the individuals transform the environment, as it is transformed by them, we show some properties and attributes of the creative physical space:

[65] BENNETT, E.; DIAMOND, MC. KRECH, D.; ROSENZWEIG, MR. Chemical and anatomical plasticity brain. Science. 1964;146:610–619.

[66] DIAMOND, M. C. Response of the brain to enrichment. An. Acad. Bras. Ciênc., Rio de Janeiro , v. 73, n. 2, Jun. 2001

(A) flexibility - surfaces to write or modify; modularity; Virtuality; Impermanence;

(B) playfulness - different roles; Being a permissible environment;

(C) access - contact with natural or organic - being able to look out, contact with live plants; accessibility; permeability;

(D) provocative - experiences that leave the commonplace. Senses: taste, smell, touch, sight, hearing;

(E) immersive - prone to live the flow;

(F) intentional - change of scenery, intention of lighting;

(G) continuity - the possibility of reliving experiences after they are no longer in space / time; records;

Having defined the domains, we explore the intersections between People, Process and Environment as Decoys, Gadgets and Legacy (figure 3). Decoys are actions and elements that encourage people to live the creative process more consciously by helping them realize the resources available in the surroundings. Gadgets are material resources and technologies enablers of experience such as areas for prototyping, tablets, writing surfaces, furniture, books and toolkits. Finally, Legacy is what remains beyond the experience of the creative process and begins to impact the person's daily life and work environment. It is worth mentioning that these intersections can change when they are explored in other ways.

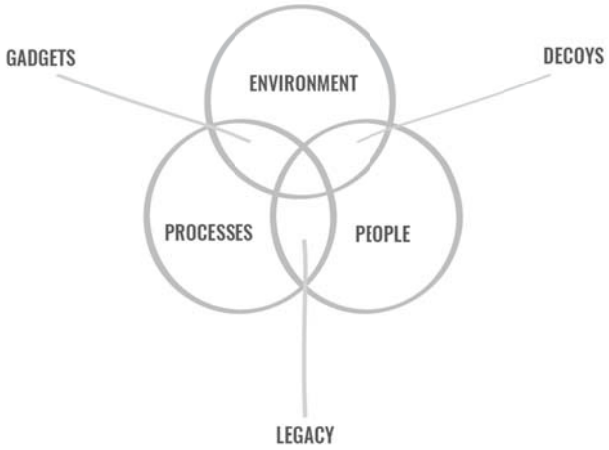

FIGURE 3: Triad intersections.

We understand that the foundations or values of CriaLab are at the intersection between People, Process and Environment (figure 4). These values are manifested through culture, which represents the union of domains (figure 5). For example, CriaLab is based on people's centrality, interdisciplinarity and attitude. Culture manifests itself through practices grounded in the foundations and supported by symbols, languages and systems of its own, offering orientations for behaviors and mindsets. Common values and experiences determine the perception of culture and shape a unique climate and experience in the environment.

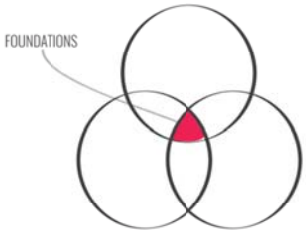

FIGURE 4: Foundation as the three domains' intersection.

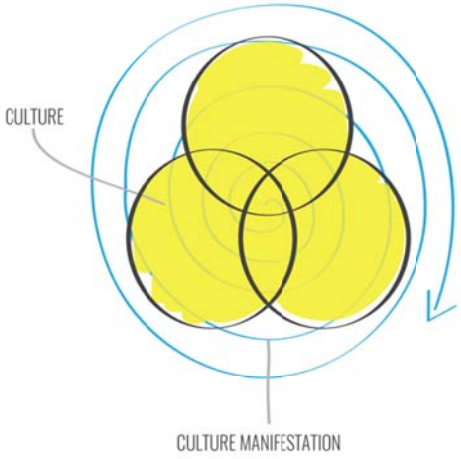

FIGURE 5: Culture as the union of the domains.

Culture is the result of practice and dissemination of fundamentals, and is not necessarily limited to the physical environment; it can overflow the boundaries of laboratory domains to take shape and influence other systems (figure 6).

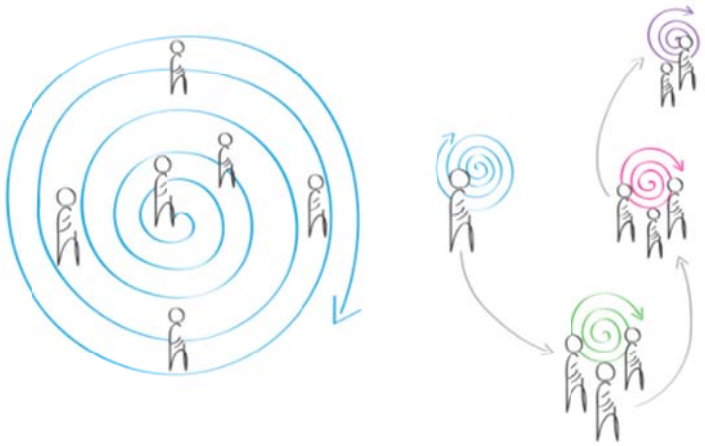

FIGURE 6: Culture dissemination.

We believe in the usefulness of this framework for companies or institutions that want to create spaces to support the creative process and innovation, especially as it deepens the reflection about the relationship of physical space with people and their processes. The framework relies on the ideia that the physical space is important, but not decisive for new practices to be brought into the companies and the university, since people who have contact with CriaLab's practices spread their new knowledge to their workspaces.

FINAL THOUGHTS

This article described the operation model of CriaLab - Creativity Lab at Tecnopuc and presented a framework for thinking about creative spaces in the STPs' ecosystems. The evolution of the Laboratory was described, supported by a technology park model that boosts the relationship between university and companies. By promoting the association of the academic community with the market, and at the same time allowing the advance of knowledge through applied research, a creative ecosystem was enabled, where companies and academic community can collaborate and connect.

Although the laboratory has had significant support from HP since its inception, its operation model is aligned to the university's. CriaLab provides services to HP, to several other companies and to the university itself.

CriaLab seeks to build bridges among the quadruple propeller actors (companies, government, university and society). CriaLab aims to break paradigms and drive mindset changes bringing society closer to a mindset focused on innovation and technology, since there is little investment in this direction, especially in countries whose development is not consolidated and the differences in opportunities are so disparate among its citizens. After all, although innovation remains an often messy and usually nonlinear process, deep investigation is pointing to emerging strategies for success. Human creativity certainly remains the bedrock of innovation.

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