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Dot Idea (.IDEA) – a new concept for incubation program and open innovation based on user need.

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Open Innovation and City Challenges

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***Dot Idea (.IDEA*) – a new concept for incubation program and open innovation based on user need.**

Executive Summary:

Many companies are seeking interaction with external actors as an alternative to enable the advancement towards identified innovation opportunities. Technology clusters, parks and incubators have been playing an important role in promoting connections and interactions. In this context, the *Dot Idea* Program emerges as a result from a joint effort to create a program that supports the development of new businesses that converge the interests of different actors into an integrated value chain. *Dot Idea* is an incubation and open innovation program co-created by Unitec, incubator of Tecnosinos, and SAP, to foster new business and strengthen Brazil and Latin America as hub to develop new solutions for traditional organizations. In regards to lessons learned, the *dot.health* cycle has shown some success and difficulties, such as the relationship between startups and the hospital internal team, and the startups' need to be funded from the beginning in order to have full dedication to the project.

Key-words: Open innovation; Incubation program; Challenges; Startups and SMEs.

1. Introduction

In an innovation-driven global scenario, where the knowledge-based economy is designed to minimize or extinguish entry barriers, smaller players advance in new or traditional market segments due to flexibility and agility of response. On the other hand, it is possible to keep up with a growing movement of traditional companies that, following the tendency or even intrinsic need for its sustainability, has been allocating continuous resources in innovation aimed at the revision of its business models, products or processes.

In the early 2000s, Chesbrough and Rosenbloom pointed out that firms are more likely to face difficult to manage innovations that were distant in their scope of organizational core business[1]. Christensen highlighted that aligning the identified opportunities or challenges to the organization's profile, based on the analysis of its competencies, is the key success factor for innovation[2].

Many companies have been seeking interaction with external actors as an alternative to advancing in identified innovation opportunities. Areas of innovation, such as technology clusters, parks and incubators, have concentrated an important part of the world's technological development. In the context of large organizations pursuing collaborative networks that drive innovation, these environments have been playing an important role in promoting connections.

This study aims to test, in a pratical way, the *Dot Idea* methodoly that was designed by the Unitec Incubator team, from Tecnosinos Tech Park, and by SAP Innovation team, which is a German company that has stablished its Latin America LAB inside Tecnosinos Tech Park. The pilot project was developed in Santa Casa de Misericordia Hospital in Porto Alegre, the capital city of Rio Grande do Sul State, South of Brazil. This project started in February 2017 and the Demo Day of the MVP (Minimum Viable Product) was in March 2018.

2. Literature Review

In this section, it will review what is already published regarding Tech Parks and area of Innovation. In addition, it will be include the recent tendency of open innovation for SMEs and innovation management. It is important to mention that SAP and Unitec Incubator teams designed *Dot Idea* methodology and the theory that gave support to this Program was especially related to open innovation and to SMEs innovation activities.

2.1 Tech Parks and Area of Innovation.

[1] CHESBROUGH, H.; ROSENBLOOM, R. S. (2002) **The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies.** Industrial and corporate change, v. 11, n. 3, p. 529-555.

[2] CHRISTENSEN, Clayton M. **O Dilema da Inovação.** Makron Books.São Paulo, 2001.

The International Association of Science Parks and Area of Innovation (IASP) defines Science and Technology Parks (STPs) as an organization managed by specialized professionals, whose main aim is to increase the wealth of its community by promoting the culture of innovation and the competitiveness of its associated businesses and knowledge-based institutions[3]. Additionally, Science Park incentivizes the flow of knowledge and technology among Universities, R&D Institutions and companies. Still according to IASP, it facilitates the creation and growth of innovation-based companies through incubation and spin-off processes, and provides other value-added services together with high quality space and facilities[4].

Science Parks play a key role in the economic development of their environment. Through a dynamic and innovative mix of policies, programs, quality space and facilities and high value-added services, they:

- stimulate and manage the flow of knowledge and technology between universities and companies;
- facilitate the communication between companies, entrepreneurs and technicians;
- provide environments that enhance a culture of innovation, creativity and quality;
- focus on companies and research institutions as well as on people: the entrepreneurs and 'knowledge workers';
- facilitate the creation of new businesses via incubation and spin-off mechanisms, and accelerate the growth of small and medium size companies;
- work in a global network that gathers many thousands of innovative companies and research institutions throughout the world, facilitating the internationalization of their resident companies[5].

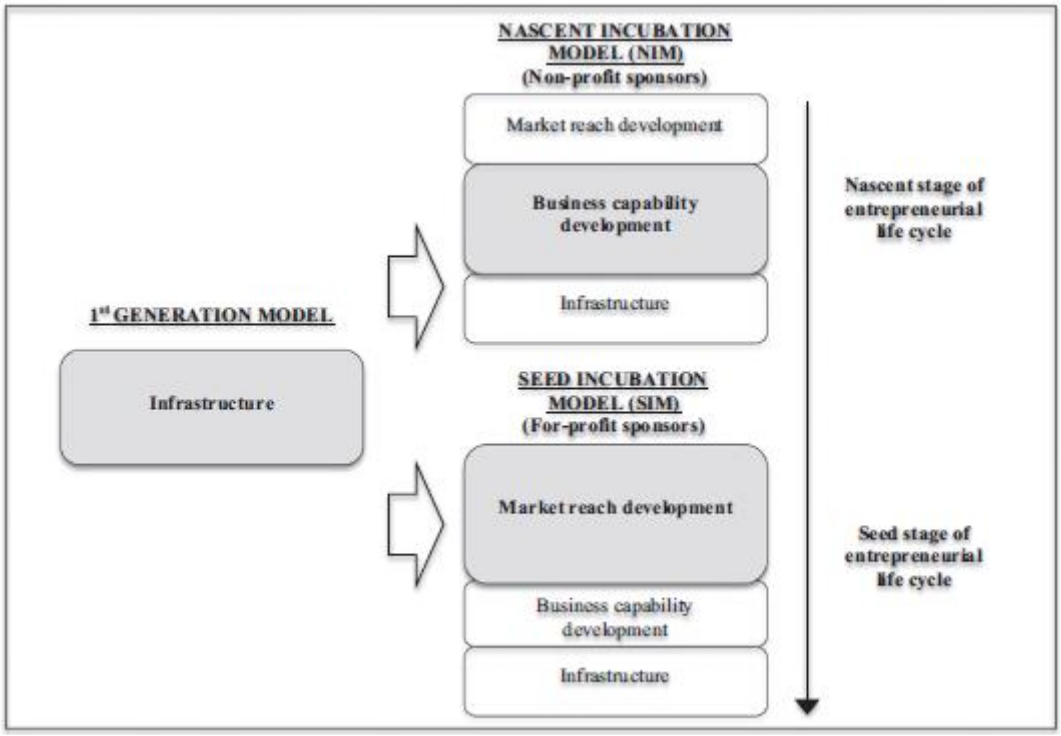
On the other hand, an Incubator is an organization that has the objective to support entrepreneurs in order to make possible to them to develop their innovative ideas into a success business (AUDY et al)[6]. Normally incubators offer a range of services that include infrastructure; capacitating and management support in order to increase succeed chances for the new business. A part of that, this collaborative ambient also increase possibilities of connections among all entrepreneurs of the Incubator.

Mrkajic, have study an incubator system in Egypt. He describe two different models of incubation, Figure 1: a) nascent incubation model (NIM) and seed incubation model (SIM)[7]. The difference between them are the stage of intervention in terms of incubated firms' development stage, by the services they provide and by the mission they have.

> "The former model is an early-stage program focused on the development of business capabilities of entrepreneurs and provision of infrastructural support. By that, it copes with knowledge and failure and demonstration externalities. The latter model is a seed-stage program focused on the facilitation of market needs of the new ventures, and taps the gap caused by network externality (MRKAJIC)"[8].

[3] IASP – International Association of Science Park and Area of Innovation. (2017). **Annual Conference**. Istanbul.
[4] Same as footnote 3.
[5] Same as footnote 3.
[6] AUDY, J., KNEBEL, P. & PIRES, S. (2017). **A Aventura da Transformação**. ANPROTEC, Brasília – DF, Brazil.
[7] MRKJIC, B., (2017) **Business Incubation Models and institutionally void environments**. Technovation n. 68. P. 44-55.
[8] MRKJIC, B., (2017) **Business Incubation Models and institutionally void environments**. Technovation n. 68. P. 53.

Figure 1 – Conceptual Framework of Incubation Model in Developing Countries



Source: Mrkajic (2017), p. 52

In the case of technology-based startups, the entrepreneurs have, also, the opportunity to connect with Universities and Research Centers, to which the Incubator has relationship. This is a key issue to mitigate risks and to reduce costs in the innovation process, because entrepreneurs can access equipment and laboratories that are very expensive to acquire.

2.2 Open Innovation

Even if an organization has an entrepreneurial culture based on innovation, this may not guarantee business sustainability. Many companies with that characteristic collapse before technological breakthrough changes and market structures, when they do not align properly the innovation possibilities with internal competencies of the organization (CHRISTENSEN)[9].

Innovations that are distant in scope of organizational core business are more likely to have difficulty in management, because their previous experiences do not apply to the challenges and potential risks that arise (CHESBROUGH and ROSENBLOOM)[10].

Managing an organization strategically imposes the need of effort allocation in priorities. Unexploited projects, because of being away from the company core business, can be market opportunities. The creation of a spin-off is considered one of the external corporate venturing opportunities, in which a company is able to capitalize effectively internal projects (LUC, et al)[11].

Schumpeter describe innovation as a process that brings a new product or service to the market[12]. At the same time, innovation is a cumulative process, because it can be radical or disruptive (CHRISTENSEN) and incremental[13]. Even when disruptive innovation occurs, it can be caused by a cumulative and collaborative process, especially in current times where all information is available to everyone through internet.

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[9] CHRISTENSEN, Clayton M. **O Dilema da Inovação.** Makron Books.São Paulo, 2001.
[10] CHESBROUGH, H.; ROSENBLOOM, R. S. (2002) **The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies.** Industrial and corporate change, v. 11, n. 3, p. 529-555.
[11] LUC, D., FILION, L. J., FORTIN, P. A. (2002) **Guia de Spin−Off de Emrpesas**. Recovered in April 10th, 2016, from: http://www.dalfovo.com/EdmilsonLima/FILION-e-colaboradores-Spin-off.pdf.
[12] SCHUMPETER, J. A. (1942), **Capitalism, Socialism and Democracy**. Harper Perennial Ed. New York, published in 2008.
[13] CHRISTENSEN, C. M. (1997). **The Innovator's Dilemma**: When New Technologies Cause Great Firms to Fail. Boston: Harvard Business School Press.

Pittaway et al. made a research to find a relation between network and innovation[14]. Their paper presents a systematic review of research linking the networking behavior of firms with their innovative capacity. They find that the principal benefits of networking as identified in the literature include: risk sharing; obtaining access to new markets and technologies; speeding products to market; pooling complementary skills; safeguarding property rights when complete or contingent contracts are not possible; and acting as a key vehicle for obtaining access to external knowledge.

As it is possible to learn from this article, collaborative network is very important to the innovation process, not only for small or startups companies, but also for large companies. May pointed out that corporate entrepreneurship is especially crucial for large companies, enabling these organizations – that are traditionally averse to risk-taking – to innovate, driving leaders and teams toward an increased level of corporate enterprising[15]. In addition to the obvious benefits obtained through innovation, this approach also provides the organizational benefit of setting the stage for leadership continuity.

Network is very important for startups especially in early stage, in order to have access to a new technology and to have access to the market. Most of times they need some advice how to get the market with their new product or service, or how the market will know what new are they doing. At the same time, speed counts. The "speed to market is an admirable goal, and there are many apparently valid reasons that cycle-time reduction should be a priority (COOPER)"[16].

According to Huizingh there is another subject to consider when study open innovation that can go beyond the obvious consequences of lower costs, shorter time to market or more sales such as a multi-dimensional construct taking into account the effectiveness, financial and nonfinancial benefits from an open innovation project[17]. Bogersa et al provide a study that reveal the positive association between diverse educational backgrounds on the level of the firm and the firm's use of external knowledge[18]. It means that to have inside the company employees with different background helps in terms of innovation initiatives. Human capital is essential for open innovation.

At the same time, it is important take in consideration the relationship between knowledge-oriented leadership and open innovation. In this regard, Naqshbandib and Jasimuddina develop a study using data collected from 172 subsidiaries of MNEs (Multinational Enterprises) based in France[19]. "The results indicate that higher levels of knowledge-oriented leadership can lead to enhanced knowledge management (KM) capability and improved open innovation outcomes (p. 701)". Their finding indicate that there is a direct and positive impact of knowledge-oriented leadership on KM capability and open innovation. Additionally their work offers useful insights for managers who want to start work with the open innovation methodology. In the same direction, Donate & Sánchez de Pablo pointed out that KM have significant relations with knowledge-oriented leadership[20].

According to Chesbrough e Rosenbloom companies have more difficulties to innovate whether they are far from their core business[21]. Their capacity to innovate could be related to an innovative environmental, such as a Tech Park or an innovation ecosystem. At the same time, Edquist pointed out that companies innovate most of the time from their interactions with other companies in some especial environmental in a virtuous circle of learning[22]. Hodgson mentioned that knowledge depends not only from an individual intellectual capacity, but also from the

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[14] PITTAWAY, L.; ROBERTSON, M.; MUNIR, K.; DENYER, D. and NEELY, A. (2004) Networking and innovation: a systematic review of the evidence. **International Journal of Management Reviews**, 5-6: 137–168. doi:10.1111/j.1460-8545.2004.00101.x.

[15] MAY, R. (2017). **Corporate Entrepreneurship and its importance in Large Companies** http://www.businessdictionary.com/article/726/corporate-entrepreneurship-and-its-importance-in-large-companies, on internet: 2017, April, 25th

[16] COOPER, R. G. (2011) **Winning at New Products** – Creating value through innovation. 4th. Edition. Basic Books, New York.

[17] HUIZINGH, E. K. R. E. (2011) **Open Innovation: State of the art and future perspectives**. Technovation n.31, p. 2-9.

[18] BOGERSA, M., FOSSB, N. J & LYNGSIEC, J. (2018). **The "human side" of open innovation: The role of employee diversity in firm-level openness.** Research Policy, n. 47, p. 218–231.

[19] NAQSHBANDIB, M. M. & JASIMUDDINA, S. M., (2018). **Knowledge-oriented leadership and open innovation: Role of knowledge management capability in France-based multinationals.** International Business Review 27, p. 701–713

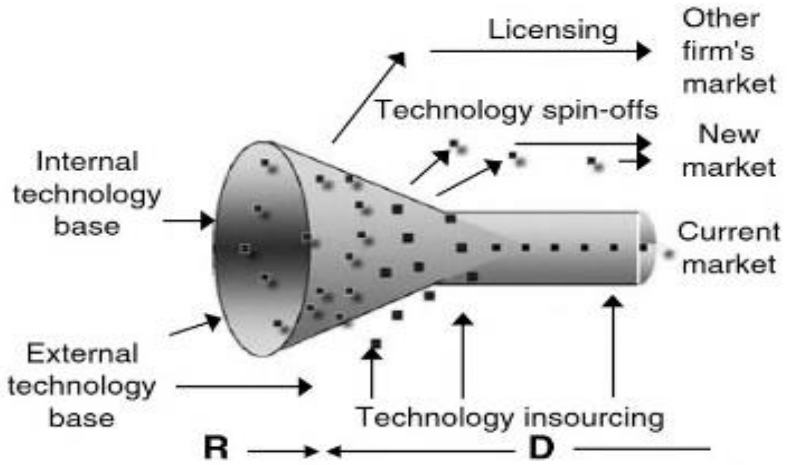
[20] DONATE, M. J. & SÁNCHEZ DE PABLO, J. D. (2015). **The role of knowledge-oriented leadership in knowledge management practices and innovation.** Journal of Business Research n. 68, p. 360–370.

[21] CHESBROUGH, H.; ROSENBLOOM, R. S. (2002) **The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies.** Industrial and corporate change, v. 11, n. 3, p. 529-555.

[22] EDQUIST, C. (2001) The systems of innovation approach and innovation policy: an account to the stat of the art. **DRUID Conference**, Aalborg Univeristy, June 12-15.

interactions with other people and partners in a physical or virtual environmental[23]. Chesbrough et al describe this model of open innovation including interactions with external input to the traditional industry as it is shown on figure 2[24].

Figure 2 – Open innovation Paradigm



Source: Chesbrough et al (2006), p. 3

In this model, the external technology base can be provided by startups as Edquist points it out[25]. Those ideas, solutions or even new products can be developed in a joint project between the internal technology base, which includes the internal R&D department and engineering, and startups, which are in general more flexible and normally provide a faster answer to the solutions needed. In a recent article, Chesbrough describe open innovation "as a distributed innovation process that relies on purposively managed knowledge flows across organizational boundaries, using pecuniary and nonpecuniary mechanisms in line with the organization´s business model to guide and motivate knowledge sharing"[26].

Fabrício Jr. et al provide a study that aims to find the relationship between the R&D center of a Chinese multinational subsidized in Brazil and other companies, universities, and research institutes in Brazil. Their conclusion is that the R&D center can be a bridge in order to attract startups companies and develop a business model that can generate disruptive innovations for the multinational products[27].

Cooperation is also a key issue, both from internal and external perspective. His study was based on service sector firms', and this author find that co-operation is an important way for collaborative innovation and firms have to engage actively with others while in the latter they only benefit from the knowledge spillovers (MENTION)[28].

On the other hand, Knudsen and Mortensen point out that on new product development performance indicate that the firm strategy is making a better job than the collaborative strategy. They also find that the degree of openness of product development make the final achievement

[23] HODGSON, G. M. (1999) **Economics and Utopia**: Why the Learning Economic is not the End of History. London and New York; Routledge.

[24] CHESBROUGH, H.; VANHAVERBEKE, W & WEST, J. (2006) **Open Innovation – Researching a New Paradigm**. Oxford University Press, New York.

[25] EDQUIST, C. (2001) The systems of innovation approach and innovation policy: an account to the stat of the art. **DRUID Conference**, Aalborg Univeristy, June 12-15.

[26] CHESBROUGH, H. (2017). **The Future of Open Innovation**. Research-Technology Management Journal. P. 35-38.

[27] FABRÍCIO JR., R. de S., DA SILVA, F. R., SIMÕES, E., GALEGALE, N. V. & AKABANE, G. K. (2015). **Strengthening of Open Innovation Model: using startups and technology parks.** IFAC-Papers On Line n. 48-3, p.014-020.

[28] MENTION, A. L., (2011). **Co-operation and co-opetition as open innovation practices in the service sector: Which influence on innovation novelty?** Technovation n. 31, p. 44–53.

slower and costly than the norm in the industry[29]. Their findings insert some criticism to the common sense of open innovation practicing in the market.

In opposition to this finding, Chiaroni et al provide a study in a mature and asset-intensive industry firm, which has adapted its organizational and managerial systems to the Open Innovation paradigm[30]. Their finding confirmed that the outside sourcing is an important component in the innovation development inside the company in order to minimize risks utilizing existing technology. At the same time, they highlighted that the internal organization is the started point of open innovation system.

According to Singh the overall evidence is consistent with a view that interpersonal networks are important in determining observed patterns of knowledge diffusion[31]. In addition, Silverberg et al mentioned, "the diffusion of new products and new processes of production within and between business enterprises is clearly one of the fundamental aspects of the growth and transformation of contemporary economies"[32]. Follow this statement, it is possible to extent it to the relationship between incubator and accelerator as part of the innovation process and creation of startups, because people are the main capital of those kind of small companies.

2.3. Innovation in SMEs

Innovation is a subject that has a very large literature and several suggested model to describe its nature that can be radical innovation and incremental innovation; systemic innovation and component innovation; technology-push and market-pull; and more recently closed innovation and open innovation. Models can also be divided according to their innovation processes, such as linear models, or according to the fitness for developed or developing countries (OSLO MANUAL)[33].

Vrandea et al have made a research on a survey database of 605 innovative SMEs in the Netherlands. In their study, they conclude that open innovation is practicing extensively among those small companies and they found that those companies have faced several different barriers for open innovation[34]. Some of them are related to corporate organization and culture, no matter which type of open innovation is pursued.

In a different study, Fernández-Olmos and Ramírez-Alesón provide a research using a panel of 44,885 observations for SMEs for the period 2003–2013[35]. Their findings "confirm the importance of the inclusion of three factors: the macroeconomic cycle (macro-level), the industry lifecycle (industry-level) and the age of the firm (firm-level) at the macroeconomic, industry and firm level since they influence the TCN (Technology Collaboration Network) and the innovation performance relationship (p.16)".

It is possible that SMEs can have some capabilities for innovation, especially because it flexibility and specificity that can be advantages in accelerating innovation. At the same time this background can manage the whole process or the integrate process together with large companies in a process of open innovation (EDWARDS)[36].

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[29] KNUDSEN, M. P., MORTENSEN, T. B. (2011). **Some immediate–but negative–effects of openness on product development performance**. Technovation n. 31, p. 54–64.

[30] CHIARONI, D. de, CHIESA, V. & FRATTINI, F. (2011). **The Open Innovation Journey: How firms dynamically implement the emerging innovation management paradigm.** Technovation, n. 31, p. 34–43

[31] SINGH, J., (2005), Collaborative Networks as Determinants of Knowledge Diffusion Patterns. IN: **Management Science Journal**, p. 756-770, May 2005. (http://pubsonline.informs.org/doi/pdf/10.1287/mnsc.1040.0349)

[32] SILVERBERG, G.; DOSI, G.; ORSENIGO, L. (1988). Innovation, Diversity and Diffusion: a self-Organization Model. Originally published in The Economic Journal in Great Britain, p. 1032-1054. IN: **REVISTA BRASILEIRA DE INOVAÇÃO – RBI** – Finep-Unicamp, v.11, n.2 jul/dez 2012. p. 253 – 275.

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[34] VRANDEA, V. vande, JONGB, J. P. J de, VANHAVERBEKEC, W., ROCHEMONT, M. de (2009) **Open innovation in SMEs: Trends, motives and management challenges.** Technovation 29, p. 423–437.

[35] FERNÁNDEZ-OLMOS, M. & RAMÍREZ-ALESÓN, M. (2017). **How internal and external factors influence the dynamics of SME technology collaboration networks over time.** Technovation n. 64–65, p. 16–27.

[36] EDWARDS, T., DELBRIDGE, R., MUNDAY, M. (2005). **Understanding innovation in small and medium-sized enterprises: a process manifest**. Technovation 25, p. 1119–1120.

Another important point is that the SMEs normally run an important role in terms of regional development, and encouraging innovation in those firms is central to development policies (JONES AND TILLEY)[37]. The main question that comes out is, how to do this, how it is possible to encourage SMEs to become innovative. It is important to offer some instruments and mechanisms that small firms can utilize for their innovations initiative. In this sense, for small firms, or startups, to be part in an innovation ecosystem, such as Incubator or Tech Park, is an important asset for their innovation initiative or projects (AUDY, et al)[38].

In this regard, it is clear that for startups to be inside an Incubator is not enough condition to become innovative. To be part in this environmental is important but not sufficient. The question that arise is what mechanisms must be provided in order to facilitate innovation in SMEs, trying to discover which factors contributed to the success of their innovation efforts. Currently technology becomes too much complex that a single startup cannot handled by itself and the knowledge is ever-more distributing across several firms, and the collaboration among them is an important factor of success. SMEs also have engaged in various modes of collaboration (KLEINKNECHT AND REIJNEM)[39].

It is important to mention that common collaboration modes are based on bi-firm networks and include alliances with and outsourcing to other firms. According to Mangematin et al, in biotechnology SMEs typically enter into contracts with big industrial groups or run small projects, manufacturing their own products and marketing them[40]. For example, in Tecnosinos a startup that invented a drone for pulverization in agriculture is working in a joint-project with a big chemical multinational company in a complementary innovative system.

An additionally point that comes out from capabilities or conditions for startups to innovate is the networking among small firms or with a large company (NARULA)[41], considering that the success of startups in comparison to their large competitors is based on their capacity to utilize external networks more efficiently (ROTHWELL AND DOGSON)[42]. Collaborative projects have some risks as for example the right of the technology that comes out from this kind of project. SMEs have been noted to use external resources to (among other things) shorten innovation time, reduce risk and cost and increase the flexibility of their operation (HAGEDOOM)[43], but their use must be carefully considered in strategic terms, as inter-firm collaboration can also lead to new risks and threats as well as transaction cost. Nevertheless, inter-firm collaboration is particularly important for SMEs with limited complementary assets who need to leverage their technology externally (LICHTENHALER)[44].

It is necessary to highlighted that in this article the main argument is the innovation in small firms, special startups, and to extent to how open innovation is embedded in those firms. The model of open innovation in SMEs will be different from that in larger firms because of both processes are different (VOSSEN)[45]. It is clear that for big companies, open innovation is a way to shorter time and to safe resources, but the reality when it is applied to the reality of day-by-day life of a company is completely different. This is the main challenge that Tecnosinos is facing in terms of open innovation methodology.

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[37] JONES, O. AND TILLEY, F. (2003) **Competitive Advantage in SMEs: organizing for Innovation and Change**. Wiley, Chichester.

[38] AUDY, J., KNEBEL, P. & PIRES, S. (2017). **A Aventura da Transformação**. ANPROTEC, Brasília – DF, Brazil.

[39] KLEINKNECHT, A. AND REIJNEM, J. O. N., (1992). **Why do firms co-operate on R&D? An empirical study**. Research Policy 21, p. 347–360.

[40] MANGEMATIN, V., LEMARIE, S., BOISSIN, J. P., CATHERINE, D., COROLLEUR, F., TROMMETTER, M, (2003). **Development of SMEs and heterogeneity of trajectories**: the case of biotechnology in biotechnology firms. Research Policy 32, p.737–750.

[41] NARULA, R., (2004) **R&D collaboration by SMEs: new opportunities and limitations in the face of globalization**. Technovation 25, 153–161.

[42] ROTHWELL, R., DOGSON, M. (1994). Innovation and size of firm. In: **Handbook of Industrial Innovation**, edited by DOGSON M. Edward Elgar Publishing Limited, Aldershot, p. 310–324.

[43] HAGEDOORN, J., (1993). **Understanding the rationale of strategic technology partnering: inter-organizational modes of cooperation and sectoral differences**. Strategic Management Journal 14, p. 371–385.

[44] LICHTENHALER, U., (2005) **External commercialization of knowledge: review and research agenda**. International Journal of Management Reviews 7, p. 231–255.

[45] VOSSEN, R. W., (1998). **Research note-relative strengths and weaknesses of small firms in innovation**. International Small Business Journal 16 (3), p. 88–94.

2.4. Concept of open innovation in SMEs

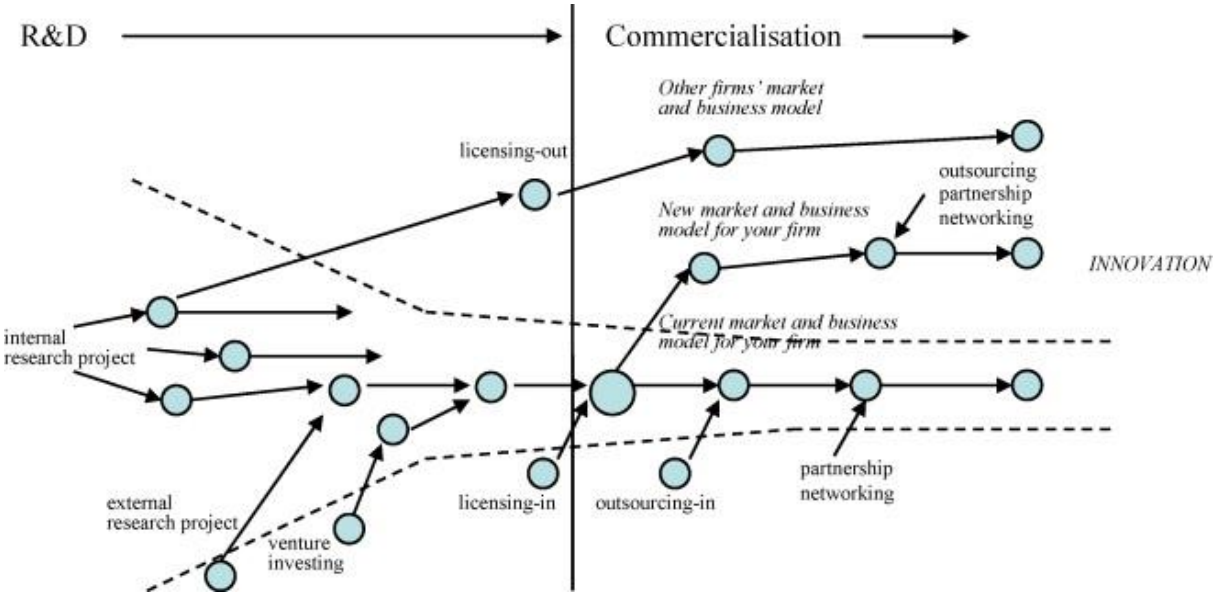
Open innovation is a concept that is applying much more to a larger companies than to a Small and Medium companies. That´s why the literature is taking this subject related to larger companies. According to Chesbrough et al, open innovation is an emerging paradigm based on the assumption that it is possible to have valuable ideas from outside the company and those ideas can help companies to be innovative[46].

In the case of SMEs, the external ideas normally come to help those companies in terms of commercialization. On the contrary, in big companies external ideas are used focusing in their R&D efforts, because in terms of inventions or innovative ideas, small companies are more flexibly and active than larger ones, and they often lack the capacity of commercialization (NARULA)[47].

According to Parida et al a research in order to investigate the existing gap regarding open innovation for SMEs. For that, they work in a data from 252 high-tech SMEs[48]. Their results show that "the empirical findings have highlighted that the adoption and utilization of open innovation activities can positively influence innovative performance of SMEs (p.300)".

Therefore, Lee et al suggests that the open innovation model in SMEs should emphasis more on the latter part of the conventional open innovation model to describe open innovation for SMEs, as it is shown on Figure 3[49]. The main point for small companies is the connections with the market. In some sense, those companies have no a strong marketing structure in order to have an adequate approach to the market. It is important to clarify that simply using an external marketing agency does not mean open innovation at the market stage. Open innovation in the commercialization stage only occurs for SMEs when a firm worked with another firm specialized in marketing, taking in mind that there is collaboration that is really a contribution to the innovation process through market exploitation, or new development of costumer relationship. Another point of open innovation is a kind of collaboration in terms of distribution that comes from a partner that have developed a new system.

Figure 3 - Open Innovation model for SMEs



[46] CHESBROUGH, H.; VANHAVERBEKE, W & WEST, J. (2006) **Open Innovation – Researching a New Paradigm**. Oxford University Press, New York.

[47] NARULA, R., (2004) **R&D collaboration by SMEs: new opportunities and limitations in the face of globalization**. Technovation 25, 153–161.

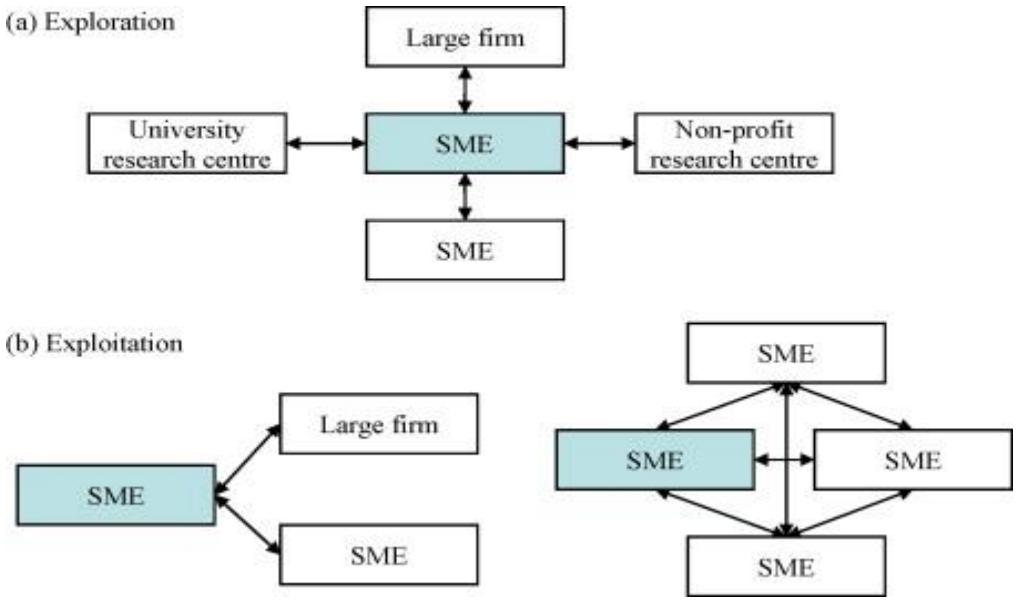
[48] PARIDA, V., WESTERBER, M & FRISHAMMAR, J. (2012) **Inbound Open Innovation Activities in High-Tech SMEs: The Impact on Innovation Performance.** Journal of Small Business Management n. 50(2), pp. 283–309.

[49] LEE, S., PARK, G., YONN, B. (2010) **Open innovation in SMEs – An intermediated network model.** Elsevier Research Policy 39, p. 290–300

Source: Lee et al (2010)

Whether the innovation process can be divided into two parts such as exploitation and exploration, taking in mind that the first part will be for technology seeking on market opportunities, and the second one for technology opportunities (ROTHAERMEL AND DEEDS)[50] it is possible to mention that the second one should be addressed more in SMEs. The figure 4 shows this model, based on Lee et al[51]. In the exploration part, SME can be connected with University research Centre and to a large firm, or even to an SME.

Figure 4 – Possible models for open innovation with SMEs



Source: Lee et al, (2010)

In the case of Exploitation SME can be connected with large firm and SME in order to find the way to innovation. At the same time, it is possible that this connection occurs only among SMEs, in a collaborative perspective of open innovation methods and techniques. It is important to mention that open innovation exclusively among SMEs is not an event that occurs frequently. In the experience of Tecnosinos, open innovation occurs much more between a large company and SMEs.

2.5 Open Innovation Management

According to Gambardella and Panico open innovation is not ruled out by markets for technology and markets for technology can co-exist with open innovation[52]. Their study was in the pharmaceutical area, where the property rights are a fundamental issue. In terms of open innovation in a traditional industry, taking in consideration the process in which there is large company working in a joint-project with startups, the property rights or the industrial property must be discussed in the beginning of the project. This is a key issue that is in the phase of pre-agreement.

Still according to those authors, there is a second natural extension is to a multi-party setting, in which several agents participate in the production of a common outcome while maintaining their own objectives. Competition is a third extension. Even whether a startup is in a

[50] ROTHAERMEL, F. T., & DEEDS, D. L., (2004) **Exploration and Exploitation Alliances in Biotechnology**: A System of New Product Development.*Strategic Management Journal n.***25**: 201–221 Published online in Wiley InterScience (www.interscience.wiley.com).

[51] LEE, S., PARK, G., YONN, B. (2010) **Open innovation in SMEs – An intermediated network model.** Elsevier Research Policy 39, p. 290–300

[52] GAMBAREDELLA, A. & PANICO, C. (2014). **On the management of open innovation**. Elsevier Research Policy Journal. Vol. 43, p. 903–913.

collaborative project with another one, they are competitors, as the Gambardella and Panico have mentioned[53]. All of those issues need a special kind of management in order to get the success of the outcome.

Another point in terms of open innovation management is the strong links to resource-based view of the firm, and, at the same time, to the related dynamic capabilities, as it is mentioned by Teece[54], when he connected capabilities to market opportunities. Other authors have mentioned the connection between open innovation and the absorptive capacity (Spithoven et al[55], and West and Bogers [56]), which makes sense, because normally this kind of project receive a strong participation of company internal members R&D department.

3. Methodology

Dot Idea was a project that was developed in three different phases. The first one was a joint project between Unitec team and SAP team in order to develop and design the program. In this phase it was used the Design Science Research as methodology. According to Peffers et al, DS is of importance in a discipline oriented to the creation of successful artifacts[57]. Still according to them, DS process includes six steps: problem identification and motivation, definition of the objectives for a solution, design and development, demonstration, evaluation, and communication.

When the objective of a study is the construction of a new method (artifact), or conduct researches focus on problems solving, the traditional sciences can be limited. The way is then to use the design science, a new epistemological paradigm to build the research. (DRESCH et al)[58].

The most important, might be to articulate knowledge eventually dispersed to develop artifacts that perform a specific function and satisfy a necessity (DRESCH et al)[59], as it is shown on figure 5. Simon defends the necessity of a science that dedicates itself to propose ways to create (build and evaluate) artifacts that have certain properties[60]. It is the science of the project – design science.

[53] GAMBAREDELLA, A. & PANICO, C. (2014). **On the management of open innovation**. Elsevier Research Policy Journal. Vol. 43, p. 903–913.

[54] TEECE, D.J., 2007. **Explicating dynamic capabilities: the nature and micro-foundations of (sustainable) enterprise performance**. Strategic Management Journal 28 (13), 1319–1350.

[55] SPITHOVEN, A. CLARYSSE, B., KNOCKAERT, M. (2011). **Building absorptive capacity to organize inbound open innovation in traditional industries**. Technovation 31 (1), 10–21

[56] WEST, J., BOGERS, M., (2014). **Leveraging external sources of innovation: a review of research on open innovation**. Journal of Product Innovation Management 31 (4), http://dx.doi.org/10.1111/jpim.12125.

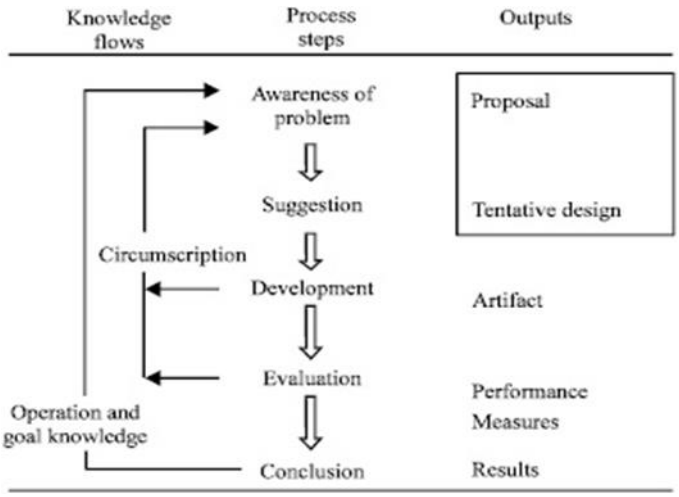
[57] PEFFERS, K., TUUNAMEN, T., ROTHENBERGER, M. A. & CHATTERJEE, S. (2014) **A Design Science Research Methodology for Information Systems Research**. Journal of Management Information Systems. Volume 24, 2007 - Issue 3Pages 45-77. Published online: 08 Dec 2014.

[58] DRESCH, A., LACERDA, D. P., ANTUNES JR., J. A. V. (2015) **Design Science Research – A Method for Science and Technology Advancement**. Springer International Publishing.

[59] Same as footnote 58.

[60] SIMON, H. A. (1996). **The sciences of the artificial** (3rd. ed.). Cambridge: MIT Press

Figure 5 – The General Methodology of Design research



Source: Adapted from Dresch et al. (2015)

In his book, Simon has written "To the project matters what and how the things should be, the conception of artifacts that accomplish goals"[61]. The design science is a science that deals with the project. Therefore, it is not interested in finding natural or universal laws that explain a certain behavior of the objects that are being studied. In fact, the design science is the science that develops solutions to improve existing systems or creates new artifacts that contribute to improve the human activity. The nature of this research is usually pragmatic and solution oriented (DRESCH)[62].

At the end of this phase, the *Dot Idea* program was design to be implemented as an open innovation methodology in large companies, as it is shown in figure 7. The first challenge was launched within the health area, in partnership with Santa Casa de Misericórdia in Porto Alegre, the largest hospital in Rio Grande do Sul, and Federal University of Science and Health in Porto Alegre. After consulting leaders and identifying a hundred innovation opportunities, Santa Casa selected five challenges to compose the *Health.Idea*, which includes relationships with patients and physicians, nursing design, bed queue management and surgical block and collection patient information at the bedside.

During two weeks, *Dot Idea* call was open on Gust Platform, receiving more than 30 proposals. From an initial evaluation by the technical staff of the program, 20 proposals were selected to participate in a face-to-face pitch session. This step resulted in the selection of eight startups that were chosen to take part of the first cycle of the Dot Idea Program. From this time, those startups began to work in the MVP (Minimal Viable Product). Five of those startups have decided do not remain in this project and gave up, during this period. Thus, the remained three startups joint in the Santa Casa Demo Day, which took place on March 28th. The Demo Day can be described as a startups pitch in front of the committee, that in the Design Science Research correspond to the expert's panel. The results of this Demo Day is presented in the next section.

4. Dot Idea as a new way for open innovation.

4.1 The role of AOI in the Startup-Industry connection.

Since its founding in the 1990s, the Tecnosinos incubator has traditionally made incubation calls with the purpose of identifying technology-based businesses to house its development and support in its structure. Throughout decades, the evolution of the technology market and the knowledge economy have been observed as a parallel movement of the traditional economy or with low interaction.

Access to a qualified network that allows optimizing the market is one of the most important values that a startup seek when being connected with an innovation ecosystem. On the

[61] Same as footnote 60
[62] Same as footnote 58

other hand, over years the incubator has witnessed the failure of some startups hosted due to its disconnection with the target market.

Based on 20 years of experience supporting the development of new business in southern Brazil, Tecnosinos considers the market target alignment one of the most critical success factor for startups. For this reason, market trends are the driver of the actions to foster innovation entrepreneurship by Tecnosinos.

In parallel, the movement of traditional industries to approach the ecosystem of innovation has been evidenced in Tecnosinos for more than 10 years. The Park has promoted punctual actions of connection between traditional industry and startups. The traditional industry-startup connection trend pointed by specialists, has been an increasingly need in Tecnosinos over the last 2 years.

In the early 2000s, meeting the value proposition of the Park, the global leader in management software SAP chose the Park to establish its Latin American development laboratory. Since its implementation, the company's operations have gradually been expanded in this unit.

Over the years, SAP and Tecnosinos have supported each other in the promotion of actions that converge on purpose, maintaining constant dialogue on the possible opportunities for joint action. From this effort emerged *Dot Idea* Program: an incubation program co-created by Unitec, incubator of Tecnosinos, and SAP, to foster new business and strengthen Brazil and Latin America as hub of internet of things solutions development.

4.2 The Dot Idea Program

Dot Idea is a program designed to promote innovation entrepreneurship, based on real market demands, supported by an incubation process of one of the main incubators in Brazil and mentoring technology and global vision of the world leader in management software.

The program proposes to reverse the order of traditional calls for incubation and development of innovation projects. Instead of supporting the development of nascent projects, the program identify and points out market demands and seeks entrepreneurs able to propose technological solutions.

Considering the real demands approach, each *Dot Idea* cycle is focused on a specific market segment challenges (Figure 6). Each call incorporates in its name the vertical identification that is focused on, so the first calls assumed the variables *health.idea, agro.idea, retail.idea* and *social.idea*.

Figure 6 - Market segment nominates each cycle of .Idea Program

Source: Unitec/SAP register of the program, 2017

Based on each segment cycle, a SAP client or partner is invited joint the program to point out the demands that will be the central scope of the call. Besides pointing out market needs, the partner company takes part of the program adding its experience throughout the development proposed by the startups, playing the role of potential early adopter of the new technology as well, as it is shown on figure 7.

Figura 7 - Program partners

Source: Unitec/SAP register of the program, 2017

The *Dot Idea* program is structured to happen in a cycle of 5-stages over 14 months: 1 - Challenges Survey; 2 - Call and Selection; 3 – Concept validation; 4 - Development and technological validation; 5 - Market validation and investment potential.

4.3 Case and Results

The pilot project, as it was already mentioned in this article, was developed in Santa Casa de Misercordia Hospital, located in Porto Alegre city. The hospital team selected five challenges to be solved in this *Dot Idea* Program, as follow:

1 – The collection of patient information at the hospital bed: Currently this information are collected manually every day. In a sequence this data are insert in the PEP (Electronic Patient information) trough a PC that is located in the Nurse station in the center of each floor. There is a gap of time between the collect and digitation and there is a risk of human mistakes in the digitalization too. The challenge here was to collect this data trough digital technology, providing information in real time reducing risk of mistakes.

2 – Management of queue of bed and of the surgery rooms: An adequate management of bed queue is fundamental in order to have a good management of surgery rooms. There is a kind of dispute of bed between normal patients and patients coming from the surgery rooms. Those need a priority and there is no any system to ordinate this kind of priority what makes the correct and feasible functioning of surgery rooms a hard task. The challenge here is to provide a digital tool to allocate surgeries in a correct surgery rooms.

3 – Nurse´s Dimensioning: Santa Casa is a high complexity hospital, meaning that to manage the Nursing assistance is crucial to the whole operation. There is an internal study to determine the nursing working hours, but there is no a digital tool in order to allocate in a dynamic way this nursing working hours.

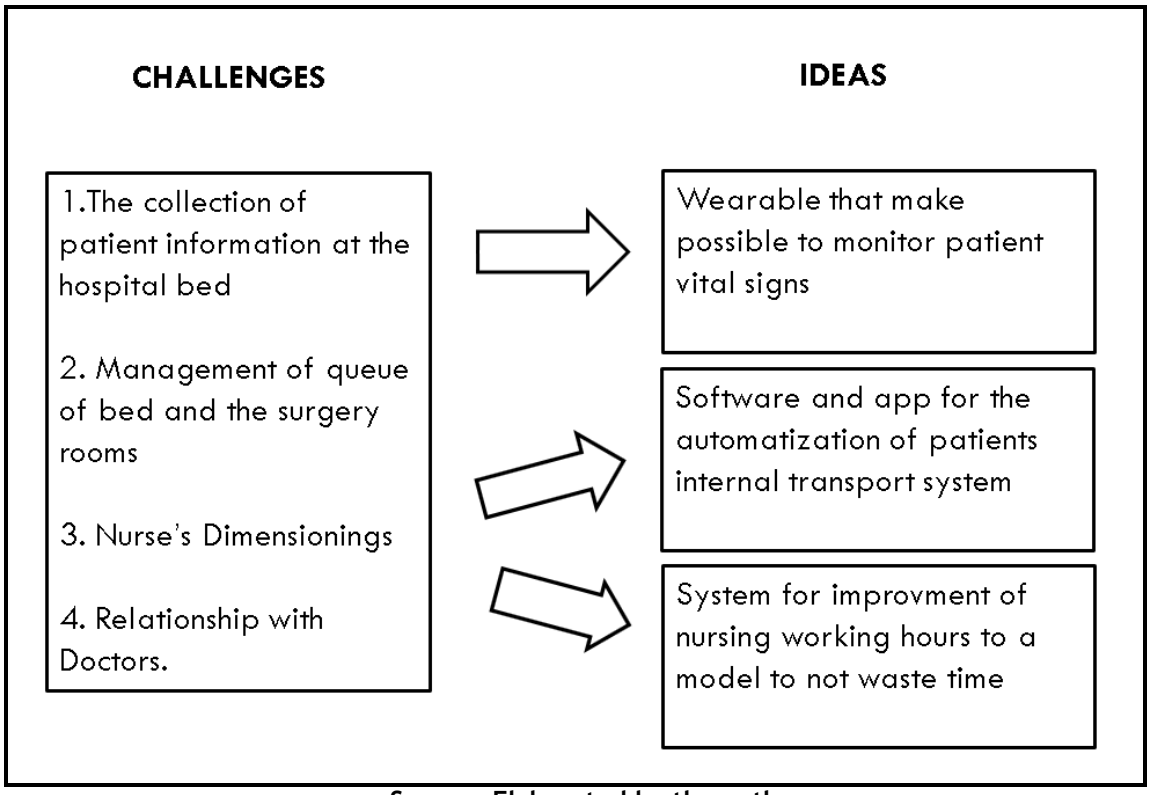
4 – Relationship with doctors: This hospital has a clinic body with around three thousand professional's residents and hired. What is needed is an electronic meeting point where all subjects of the relationship between hospital and professionals can be done, such as agenda, patients data base, documents and orders to be signed electronically and so on.

5 – Relationship with patients: Santa Casa provide more than six millions of attendances among exams, medical procedures, surgeries, doctor consultations and fifty thousand of hospitalizations. What is needed is a focal point that provide the relationship with patients where they can a) make consultation appointments; b) pick up exams (already in operation); c) make check-in; d) send feedbacks to the hospital from their rooms; e) where the patient's relatives can obtain information regarding patient evolution. For this challenge there was not any solution presented by startups.

These challenges were open in the Gust Platform and twenty startups were selected out from 35 that have sent proposals, and eight of them were classified to participate in the program. During this period of six months, in which startups have worked in the MVP, five of them gave up and three reach the final stage. They presented their solution in a pitch to the Santa Casa Demo day committee on March 28th, 2018. Two of them were approved (Startup B and C) and one (Startup A)

received an extra time in order to complement its solution. The solutions that were presented on the Demo day are shown on Figure 8:

Figure 8 – Challenges and solutions



Source: Elaborated by the authors.

1 – Startup C – It faced the challenge regarding patients internal control and its MVP was a wearable that make possible to monitor patient vital signs. However, the committee pointed out several critical points that must be better worked such as to focus more on the essential vital signs in order to make it more viable for implementation in a big hospital.

2 – Startup A – this startup presented a solution to the challenge nursing dimensioning. Its MVP was a software and app for the automatization of patients internal transport system. It was approved and a key issue is the timing for implementation.

3 – Startup B – This startup offered a solution to the nursing dimensioning as well. The MVP was a system that provide improvement in the normal system of nursing working hours to a model that can safe wasting nursing time, and to reduce the nursing paying extra working hours, meaning that at the end it will reduce costs.

5. Discussions

This was the first application of the *Dot Idea* methodology in a traditional organization, which was a Santa Casa de Misericórdia Hospital from Porto Alegre, capital city of Rio Grande do Sul State, South of Brazil. This was a great opportunity to see in a practical way how it is possible to implement this methodology in a real case. Some of the findings are related to the people involved in the process, either internal staff of the organization and the entrepreneurs of the startups (GAMBARDELLA AND PANICO[63]; CHESBROUGH and ROSENBLOOM[64]; PITTAWAY et al[65]).

[63] GAMBAREDELLA, A. & PANICO, C. (2014). **On the management of open innovation**. Elsevier Research Policy Journal. Vol. 43, p. 903–913.

Other point that matched with findings of authors is related to knowledge management. Internally in the organization, there are different kind of tacit knowledge that is not in a prescriptive manual and sometimes people are not willing to divide it with a member from outside such as an entrepreneur from a startup that is working in a joint-project. (GAMBARDELLA AND PANICO[66]; TEECE[67]; SPITHOVEN et al[68]; WEST AND BOGERS[69]; MENTION[70]).

Additionally this work brought a new unexpected perspective that it was not planned from the beginning, which was that five startups withdrew from the project with the allegation that it was a hard work inside a big organization and probably their solution would not reach the objective of the project. This problem was not totally described in the previous literature, but some of the authors (LEE et al[71]; ROTHAERMEL AND DEEDS[72]) mentioned that innovation inside SMEs is a model that involve special characteristics that must receive especial attention in a joint-project of open innovation.

Finally, it is important to mention the main finding of this work, which is that the collaborative project (KNUDSEN AND MORTENSEN[73], CHESBROUGH[74]) produced a positive strong effect on the results presented by the three remained startups, and the Hospital's Administration approved two solutions and asked improvement on the third solution as it is described above.

6. Final Remarks

Technological parks and incubators have the opportunity to act as strategic actors in the promotion of network connection between the challenges of consolidated organizations and the technological innovation capacity of startups.

The challenge is to consolidate a systematic and continuous model of information flow capable of identifying complementarity between business and technology, balancing interests and connecting markets in order to promote a virtuous and sustainable interaction between the actors involved.

Dot Idea emerges as a result of a joint effort on co-creating a program to support the development of new business that converge interests of different actors in an integrated value chain. The repercussion of the program *Dot Idea* have been indicating a strong alignment with challenges faced by the need of connection between traditional industry and innovation entrepreneurial ecosystem.

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[64] CHESBROUGH, H.; ROSENBLOOM, R. S. (2002). **The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies.** Industrial and corporate change, v. 11, n. 3, p. 529-555.

[65] PITTAWAY, L.; ROBERTSON, M.; MUNIR, K.; DENYER, D. and NEELY, A. (2004) Networking and innovation: a systematic review of the evidence. **International Journal of Management Reviews**, 5-6: 137–168. doi:10.1111/j.1460-8545.2004.00101.x.

[66] Same as footnote 63

[67] TEECE, D.J., 2007. **Explicating dynamic capabilities: the nature and micro-foundations of (sustainable) enterprise performance**. Strategic Management Journal 28 (13), 1319–1350.

[68] SPITHOVEN, A. CLARYSSE, B., KNOCKAERT, M. (2011). **Building absorptive capacity to organize inbound open innovation in traditional industries**. Technovation 31 (1), 10–21

[69] WEST, J., BOGERS, M., (2014). **Leveraging external sources of innovation: a review of research on open innovation**. Journal of Product Innovation Management 31 (4), http://dx.doi.org/10.1111/jpim.12125.

[70] MENTION, A. L., (2011). **Co-operation and co-opetition as open innovation practices in the service sector: Which influence on innovation novelty?** Technovation n. 31, p. 44–53.

[71] LEE, S., PARK, G., YONN, B. (2010) **Open innovation in SMEs – An intermediated network model.** Elsevier Research Policy 39, p. 290–300

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[74] CHESBROUGH, H. (2017). **The Future of Open Innovation**. Research-Technology Management Journal. P. 35-38.

For Tecnosinos and Unitec incubator, the program meets its main mission: to strengthen the ecosystem of innovative entrepreneurship focused on the development of the knowledge economy in the region, while increasing the success rate of the nascent enterprises.

In the meaning of lessons learned this program have shown to the Unitec and SAP teams that open innovation in a big company is not an easy task. Some difficulties came out, such as the relationship between startups and the Hospital internal team – doctors and nurses – is a difficulty, normally related to a time spending for this activity, that was not taking into account during the planning phase. It was learned that from the beginning it is important to have a person that is responsible inside the company to make those connections and to have the commitment of the working people in order to test and to work with startup during the project.

Another point that was learned is that startups need to be funding from the beginning in order to have full dedication to the project. At the same time, the first choice must be very critical to avoid startup give up, as it was happened in this project.

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