Obstacles to Radical Innovation

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A Project carried out on the Strategy area, under the supervision of
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1. Abstract
Radical innovation is on the agenda of many companies and researchers. Using three lenses of analysis (organizational resource’s platform, culture and structure) interviews in two Portuguese companies were conducted in order to identify such barriers. It was found that barriers differ per case but common barriers were identified. A conservative budgeting practice controlled by a restrict group and a hierarchical structure jeopardize the ability to explore and therefore they also “hurt” the capacity to radically innovate. Moreover, it was found that the lack of cooperating competencies undermine the innovation competencies of any company. Below a discussion of such findings will be presented.

Keywords: Radical Innovation; Resource Based View; Culture; Structure.
2. Purpose and scope of the project
The difficulties experienced by established firms in adjusting to changes under a
dynamic competitive environment have caused market leaders to falter and allowed new entrants to prosper (Grant, 1996). This Work Project aims to understand how firm characteristics impact radical innovation (RI) on already established large sized Portuguese companies. The literature on innovation clearly distinguishes incremental innovation from radical innovation (Story, Daniels, Zolkiewski, & Dainty, 2014). As the best way to meet today’s formidable growth challenges is not through incrementalism but through radical, game-changing innovation (Skarzynski & Gibson, 2008), this study will focus only on radical innovation. The research on what allows some companies to radically innovate, while others do not, is commonly divided into those that study the foundations for innovation, the so called innovation drivers approach (Aarikka-Stenroos & Sandberg, 2014), and those who try to understand what blocks innovation, the barrier approach (D’Este, Iammarino, Savona, & von Tunzelman, 2012). This study will follow closely the second stream since it is much less organized and explored on the extant literature (Holz & Janger, 2012). The most commonly used categorization of innovation barriers is, according to Aarikka-Stenroos & Sandberg (2014), division of internal and external barriers and that is therefore the chosen categorization for the purpose of this Work Project.
According to Peter Drucker (1985), it is the existing business and the fair-sized, rather than the small one, which has the best ability to innovate. Hence, this study will focus on large-sized companies. Assuming that most of the times large-size Portuguese companies cannot influence their global external environment, this study will only consider the internal barriers. Three lenses will be considered. The first lens of analysis will analyze the resources’ platform of a company, from the theoretical perspective
“resource-based view” of the firm (Barney, 1991). The second lens will be centered on the organizational culture theme and the third one will be based on the firm’s organizational structure point of view. This Work Project empirical analysis will be based on data collection from the cases of two large Portuguese companies, CORTICEIRA AMORIM, S.G.P.S. and SIMOLDES PLÁSTICOS, S.A.

3. Literature review
Firms face numerous obstacles and challenges which on literature are commonly termed innovation barriers (e.g. D’Este et al., 2012). Radical innovation barriers seem to be a complex and dynamic phenomenon as their existence tends to vary for different firm activities (Aarikka-Stenroos & Sandberg, 2014) or with the industry competitive pressure. Moreover, the concept of innovation barrier is still quite ambiguous. For example, D’Este et al. (2012) distinguished revealed barriers, those that reflect the degree of difficulty of the innovation process, from deterring barriers, those that encompass the obstacles that prevent firms from committing to innovation. The most common categorization (Aarikka-Stenroos & Sandberg, 2014) is however the one which distinguishes internal barriers, those that a firm can influence, from external barriers, those barriers that are beyond the extent of the firm’s influence.

Furthermore it is difficult to gain a comprehensive understanding on RI barriers since the very definition of RI is inconsistent and ambiguous in the extant literature. It is important to, firstly, explore what distinguishes radical innovation from other types of innovation, such as the incremental innovation (II). Joseph Schumpeter was one of the first economists who clearly addressed this issue. On “The Theory of Economic Dynamics”, published in 1911, Schumpeter opposed “radical” innovations or “technological revolutions”, introduction of a totally new type of machinery, to “incremental” or “marginal” innovations. As time passed by, the concept of innovation
has been evolving to a more economic or social angle rather than a purely technical perspective (Drucker, 1985). A great example of that is the definition of RI according to Skarzynski and Gibson (2008) that an idea is truly radical if it has at least one out of three effects: 1) the power to dramatically reset customer expectations and behaviors; 2) the power to change the basis for the firm’s competitive advantage; 3) the power to change industry economics. Radicalness can be measured by its consequences on the market or by its novelty - to what extent it completely breaks the prevailing design norms (Aarikka-Stenroos & Sandberg, 2014). Consequently, II concerns an upgrade of the performance of an existing product, service, process, organization or method. It seems that the extant literature agrees that RI, as opposed to II, has higher impact on the marketplace but it is, nevertheless, the less prevalent type of innovation. Finally, although RI barriers seem to differ from those of II, the studies on RI barriers do not necessarily need to distinguish between different types of RI (Aarikka-Stenroos & Sandberg, 2014).

3.1 Resource Based View
The resource based view (RBV) is a theoretical approach to assess firms’ competitiveness through the heterogeneity of the productive services available from its organizational specialized assets, competencies and architecture of relations which combined constitute the organizational resource’s platform. To support firm’s competitive advantage some of its assets, competencies or relationships must be valuable (or relevant), rare (or scarce), inimitable, non-substitutable, non-tradable and organizationally embedded (Kostopoulos, Spanos & Prastacos, 2014). Despite of the uniqueness of each organizational resource’s platform, the literature has identified a number of assets, competencies and relationships which improve any company ability to radically innovate and, therefore, the absence of them act as barrier to RI.
The Agency and Transaction-costs literature suggests that internally generated funds are more commonly used to finance R&D activities and investments, due to information asymmetries (Aarika-Stenroos & Sandberg, 2014). Additionally, Aarika-Stenroos & Sandberg (2014) study suggests that the high visibility of some innovating teams makes them an easy target for cutbacks whenever they produce little profit. Skarzynski & Gibson (2008) also found that traditional budgeting and resource allocation processes, which are usually among the most disciplined processes, are pervasive barriers to RI since the vast majority of the organization’s revenues are coming from existing customer segments and thus the “innovations” that end up getting funded are typically the incremental product enhancements. Not having enough cash to finance the right ideas is therefore a barrier to RI. The literature very commonly refers to the inadequacy, or even inexistence, of technical resources (e.g. engineer equipment, IT systems, knowledge management tools) as a reason to deter RI. Over the past decades firms’ intangible assets became more important to firms’ competitiveness (Barney, 1991). Several studies analyzed by Aarika-Stenroos & Sandberg (2014) found that the lack of advanced technical skills and know-how can limit the firm ability to introduce a breakthrough on the marketplace.

According to RBV, not only must firms be able to create knowledge within their boundaries but they must also be exposed to new ideas coming from the outside. Studies on innovation barriers generally refer to how restrictive to RI can be the role of an undeveloped network and ecosystem. Aarika-Stenroos & Sandberg (2014) identify the lack of external partners as one of the difficulties preventing RI. The inertia among the current actors to change their behavior makes radical innovation very difficult whenever there is a need for different network actors. The same authors showed that incubation of new ideas in B2B markets can be limited by the firm’s ability to cooperate closely with
customers. Skarzynski & Gibson (2008) enumerated several examples of partnerships which may facilitate the firm’s ability to radically innovate, such as cooperation with knowledge centers (e.g. Universities, R&D centers) or associating with venture capitalists. Hence, difficulties in identifying relevant new partners and managing alliances, both examples of organizational competencies, may constitute a barrier to RI. Indeed, organizational competencies are very instrumental to dynamically coordinate firm’s relationships and put in productive use all firm’s assets in order to radically innovate.

O’Connor and DeMartino (2006), on their exploratory study about RI management, grouped RI competencies in three major groups: Discovery, Incubation and Acceleration competencies. Based on the conclusions of other researchers, the authors suggested that focusing narrowly on meeting the needs of current customers usually undermines the firm’s ability to create new ideas (e.g. R&D management, New Product Development) and to recognize the opportunities to radically innovate (e.g. Market research) – Lack of discovery competencies. Difficulties in building a business structure and culture which takes full advantage of an opportunity is, according to O’Connor and DeMartino (2006), what prevents a firm to overcome the “valley of death” – lack of incubation competencies; Story et al., (2014) argues that most firms ultimately fail because they can’t build the business platform for the new product/service or because they lack on marketing research competencies – lack of acceleration competencies. O’Connor and DeMartino (2006) approach may be too undetailed. Further research introduced more insights about which organizational competencies enhance the firm’s ability to introduce a RI. For example, managing open-innovation, as efforts of firms to search beyond their organizational boundaries for knowledge required to innovate by employing, for example, individuals who cross company boundaries, technology
licensing, or organizational liaisons (Wales, Parida & Patel, 2013) become one of the most known examples. Skarzynski & Gibson (2008) attributed to compensation systems and innovation performance systems a great deal of importance. Whether by fault or design, the measurement systems, such as EVA and ROI, tend to focus people’s attention on optimization rather than innovation. CEOs might preach the need for risk taking and rule breaking, but these are not the metrics they typically use for measuring their managers’ performance. Moreover, financial rewards and promotions are usually based on that unholy trinity of conventional management: “meet the deadline,” “make the budget” and “don’t screw up”. Thus, innovation doesn’t take off inside an organization either, if managers don’t understand that they are being measured and rewarded based on the health of their innovation pipeline and on whether they close ambitious growth gaps that are tied to the company’s innovation platform. (Skarzynski & Gibson, 2008)

3.2 Organizational Structure
Traditionally, one of the most important research questions of the management literature has been the relationship between innovation and firm structural characteristics (Green & Cluley, 2014). The authors suggest that as businesses grow there is a tendency to add layers, becoming more mechanistic and institutionalizing bureaucracy. Such mechanistic and rigid structures favor rapid task definitions and mainly vertical communication, only possible in a stable environmental context of low technological uncertainty. Thus, it leads to the separation of all research and development activities from the rest of the organization causing coordination and communication difficulties, constitute usually an unsupportive organizational structure to innovation (Aarika-Stenroos & Sandberg, 2014). Consequently, such hierarchical structure tends to neglect the ideas coming from ordinary employees and the ideas only get a “free pass” if they
come from somebody working in the R&D department (Skarzynski & Gibson, 2008). Thus creative organizations, in a very dynamic and ambiguous environment, tend to start out with a much more flexible structure, a common culture where communication occurs in a vertical and horizontal way (Cluley & Green, 2014). Story et al. (2014) found that RI is usually built upon several cross functions and divisions interactions within the firm and its network. Likewise, based on several other researches, Cluley & Green (2014) found 1) a negative correlation between high-levels of hierarchy and innovation; and 2) that managers of highly innovative firms usually stress the importance of “an external and flexible orientation”. Hence, pure command-and-control organizations constitute a barrier to RI since they exhibit a systemic bias against the exploration of the new ideas.

3.3 Organizational Culture
According to Aarikka & Sandberg (2012), on their systematic review of the existing literature about barriers to radical innovation, the main internal barrier to RI is the existence of a restrictive mindset. According to the same authors often the former barrier leads to resistance to change and lack of risk-taking decision processes. Hence, established routines (existing patterns), existent social and political structures and the common inclination for the exploitation over the exploration coupled with the uniqueness of the configuration of firm’s strategy, structure and systems lead firms to avoid disruptive changes. Since RI requires more game-changing and a more democratic and inclusive approach, this barrier tends to assume a great deal of importance. Leading innovators encourage, expect and reward innovation from everywhere within the organization – not just from the research and development team (Lawson & Samson; 2001). This isolation leads to a segregation of responsibilities which hampers RI because it isolates teams. For instances, Skarzynski & Gibson (2008)
emphasize the importance of IT as means to democratize knowledge management throughout the firm rather than localize it in one side of the company. The authors also introduce the concept of a “monopsony” on ideas which, according to them, constitutes a barrier to RI. This concept refers to the fact that only a very distinct group of people usually decide about which ideas should go further and such restrict group of people may be influenced by their own judgements when appraising the potential of a new idea. Companies’ scorecards are usually weighted heavily toward optimization rather than innovation and it reflects the reality of historical focus and path-dependency within most organizations, a barrier to RI (Skarzynski & Gibson, 2008).

4. Research aim and methodology
Below, section 4.1 describes the case organization of the research; section 4.2 describes the rationale for the research and methodology.

4.1 Case organization
The research sites are two companies, Corticeira Amorim (Cork industry) and Simoldes Plásticos (Plastics Injections industry). Occasionally, a radical innovation may happen in such companies as a result of ideas generated from collaborative projects. From an innovation point of view, they have quite different approaches on developing their own innovation efforts. Being both leaders on their respective industries, innovation management is on their agenda as a top priority in order to maintain their leading position.

Both companies have gone through many complex organizational changes and understanding the effect of those changes, from a RI point of view, is the goal of the present research.

4.2 Methodology of analysis and data gathering
On this project it is possible to find a theoretical framework which helps to identify internal barriers to RI. Building on the resource based view, organizational structures
and organizational culture perspectives, it is assumed that, when taken together all the three lenses, internal barriers to RI can be identified.

According to Lawson & Samson (2001), firms do not compete on new products, but rather on the ability to develop new products. High-performing innovators make innovation an organization-wide strength that depends not only on their efforts to innovate – newstream business activities; it depends as well on firm’s ordinary activities – mainstream business activities (Lawson & Samson, 2001). Therefore, innovators must integrate the management of mainstream factors with innovation management. To provide an assessment of the organizational resources’ platform and to identify what is hampering RI, it is essential to compare the firms with the industry patterns. To do so, using a scale of 1 to 10, it is necessary to measure the strategic importance (SI) of a given strategic asset, competence or relationship to the industry as well as the firm’s relative strength over their competitors (RS) on that asset, competence or relationship. Having built a two-by-two matrix, where on the “x-axis” it is represented the SI and on the “y-axis” it is represented the RS, it is then possible the identification of which strategic assets, competencies or relationships are barriers to RI and which are not. Any of those which have a high strategic importance and low relative strength (4th quadrant of the matrix) may be a barrier to RI. Following the literature review, the subsequent specialized assets, competencies and architectures of relations that strengthen the firm’s ability to radically innovate will be considered:

- **Specialized Assets:** A1) Knowledge management platform; A2) Patents; A3) Cash-to-burn; A4) R&D centers and/or Skunk works center; A5) International reputation; A6) I&D Knowledge.
- **Competencies:** C1) “Stretching” goals for innovation; C2) Discovery competencies and innovation appraisal; C3) Incubation competencies; C4) Commercialization
competencies; C5) Ambiguity and risk management; C6) Recruiting “would-be” innovators.

- Architecture of relations: R1) Incubation/Acceleration Centers; R2) Knowledge centers; R3) Cooperation with clients; R4) Cooperation with suppliers; R5) Cooperation with any other kind of partner.

There will be as well the structuring of a framework to make sense of the organizational structure and the culture of the companies to then navigate in RI. To do so, let’s turn to the methods used by Bourdieu’s (1983): he saw innovation as an exercise based on shared practices (procedures, understandings and engagements) that shapes what people do. These can be structured through a binary opposition of “commerce” (conventional working practices that produce economic capital) and “autonomy” (unconventional practices and organic organizational forms which produce artistic capital). Adapting from the research of Green & Culey (2014), this Work Project modifies Bourdieus (1983) work to “fields of radical innovation”. It is going to be considered that a company’s practices can either mirror a cultural environment of pure isolation of the different activities – exclusive; or a cultural environment where there is a deep linkage between the different activities – inclusive. Additionally, it is going to be considered that a company’s practices can either favor a mechanistic organizational structure or a dynamic organizational structure. Through the representation on a two-by-two matrix, being on the “x-axis” represented how inclusive or separate is the culture of the firm and on the “y-axis” how mechanistic or dynamic is the structure of the organization, a categorization of the type of organizational structure and the characteristics of the organization’s culture, according to several firm’s practices, is then conceivable.

Building from the literature review, the following practices will be considered:
Newstream: 1) Stretching innovation goals; 2) Working on new ideas; 3) Appraising new ideas and investment decisions; 4) Developing new products.

Mainstream: 1) Organizational organigram & Work Space; 3) Decision-making mechanism; 2) Communication; 4) Remuneration system.

To conduct the field work on the two companies a longitudinal research (Pettigrew, 1990) was performed, as this method helps to “represent the temporal sequence that unfolds around innovation” (Cluley & Green, 2014, p. 1345). It was decided to approach those two companies in order to interview, at least, two people per company. During a period of 4 weeks, 5 one-to-one structured interviews were recorded. Nonetheless, interviewees were asked to be part of an unstructured dialogue and to add any suggestion. Each interview lasted between a minimum of 30 and a maximum of 75 minutes and they all sum up to 5 hours and 30 minutes of interviews. They were all conducted by the author of this project. The names of those 4 interviewees can be found on table I (Appendix I). The script and interviews transcripts can be found on Appendix II.

5. Findings
Corticeira Amorim (CA) and Simoldes Plásticos (SP) have both gone through a quite complex organizational change after 2007. Both companies claimed that they had never performed as fine as they are doing today. There will be two relevant findings sections: 1) Organizational Resources’ Platform; 2) Organizational structure and culture.

5.1 Organizational Resource’s Platform
One of the most profound changes, observed in both companies, was the structuring of innovation processes. These organizations felt the need to include more people on their innovation efforts and therefore they had to build tools and processes which allowed for such connectivity. In trying to overcome this barrier they both developed an integrated
platform for knowledge management (A1)\(^1\) where everyone in the company could introduce new ideas for innovation purposes. In their beginning, such platforms were transversal to every business unit of both companies. Hence, if we analyze exhibit II we observe that A1 moves upwards on the 2\(^{nd}\) quadrant as one of the strengths of CA. In its turn, SP program is transversal to every business unit but they feel that the participation of every employee happened in the beginning of the program and, today, it is not really being used by everyone. Nonetheless, as it did not really exist before 2007, they considered that knowledge management was improved through such platform. On exhibit I, A2 goes from the top of the 4\(^{th}\) quadrant to the top of the 2\(^{nd}\) one when we compare 2015 and 2007 matrixes ((exhibit I and 2 – Appendix I).

Furthermore, such platforms helped both companies to improve their capacity to generate new ideas for two reasons: 1) the platforms allowed other employees, beyond R&D teams, to contribute with new suggestions; 2) It facilitated the aggregation of all information in one place. So, along with other factors to be discussed further, such platforms improve what literature called “discovery competencies” (C2). Both companies claimed that having good market research and new product development is strategically important and that is why they invested on improving their discovery (C2) and incubation competencies (C3). However such platforms for knowledge management helped them to do it better when they were already good performers, at least when compared to the market. Such claim requested further analysis. Therefore, it was asked to both companies to analyze their I&D knowledge (A6) as an asset. As in the cases of C2 and C3, we observe, in both companies, a slight movement upwards of the A6 on the 2\(^{nd}\) quadrant when we move from 2007 to 2015 (exhibit I and 2 – Appendix I).

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\(^1\) Note: Please refer to the classification of specialized assets, competencies and architectures of relations defined during the methodology (page 11).
Yet, when we observe the recruiting of “would be innovators” competence (C6) we find distinct results in each company. Both companies classify its strategic importance as key to the industry and they both were not investing too much on that back in 2007. So, if we analyze our exhibits 1 and 2 we see that in 2007 this was a barrier to RI in both companies. Through Amorim Cork Composites and Amorim Cork Ventures, CA has now a much more proactive approach to attract such “would be innovators” but SP still faces an important barrier to RI, as they continue to not invest too much on improving such competence. Henceforth, on our exhibit I on Appendix I (SP), we observe a slight movement upwards of C6 but on the case of CA (exhibit II - Appendix I) we note a movement from the 4th quadrant in 2007 to the 2nd quadrant in 2015. Finally, it is important to mention that such moves are isolated from the standard recruitment practices which were always strength of both companies.

As a consequence of the restructuring of innovation practices, the processes of innovation appraisal and allocation of resources were also consolidated. Both companies evaluate each project individually according to several criteria which then determine the amount of resources, including the volume of cash that should be allocated. These criteria follow very well defined optimization metrics. Both companies use the Balanced Scorecard technique when allocating resources to new projects, because it allows them to align cost optimization goals with innovation goals. Therefore, managers of CA conclude that neither the competence to manage risk and ambiguity (C5) nor leaving some non-controlled cash and resources (A3) to foster innovation are strategically important or need to be improved, as we observe C5 located on the bottom of the 2nd quadrant in both matrixes of exhibit II (Appendix I) and A3 located on the 3rd quadrant of the same matrixes. As CA, SP does not find necessary to invest on having cash-to-burn (A3) but that is not the case for the improvement of their
risk-management ability to a less conservative approach (C5). They find it (C5) strategically important and they improved such competence over the past years in such a way that it is no longer a barrier but a strength of SP. On exhibit I (Appendix I) we observe that C5 is located on the 4th quadrant of the 2007 matrix and on the 2nd quadrant of the 2015 matrix. A3 has always stayed in the top of the 3rd quadrant in both matrixes, as a not so necessary asset.

Another common step, taken in 2007, was the enlargement of each company innovation partners’ scope. To “beat” this barrier they fought on different “war fronts”. Amorim Cork Composites had already been set up before 2007, as a business unit of CA which intends to develop any kind of cork application. They are now cooperating with non-traditional clients (R3) like NASA or Samsung which were not before on the client reach of CA. Amorim Cork Composites represented, in 2014, 15% of CA total sales. Moreover, Amorim Cork Composites also cooperates with knowledge centers (R2), like Universities, and some external incubators (R1). CA founded, in 2014, Amorim Cork Ventures in order to expand even more their boundaries for new ideas creation. Amorim Cork Ventures is an incubator for those who may have new ideas where cork is a differentiation factor and it is also a step moving towards what literature calls “open innovation” (R5). In its turn, SP has enlarged its own cooperation scope but they played in a quite different way. After recognizing the importance of suppliers, from a cost point of view, SP decided to innovate alongside suppliers (R4) “so that they can also innovate and improve the quality of proposals in terms of added value”. They also increased the degree of cooperation with their clients (R3) and they also invested on cooperating with foreign knowledge centers (R2) and external incubators (R1). However, given their strategic focus on the automotive industry, they decided not to go further than what they did. They did not take any other significant step towards an even broader cooperation
scope (R5), even though they attributed a quite high strategic importance to the extension of cooperation partners.

There is one contradiction between the results of both companies though. It regards the role that “patents” play on their industry. Since 2007, CA has been disinvesting on patenting each new product because they think that they can only benefit if the use of cork becomes wider. So, CA had a not relevant strength which they have been disinvesting on. That is why on exhibit II (Appendix I) we observe a move from the 1st quadrant (2007 matrix) to the 3rd quadrant (2015 matrix). That is not the case of SP at all. They find patents (A2) strategically important and they have been investing much more on creating new ones since 2007. Therefore, it is possible to observe, on exhibit I (Appendix I), a move from the 4th quadrant in 2007 matrix to the 2nd quadrant in 2015 matrix.

Finally, it is important to analyze the cases of two “assets” which are strategically essential for the two companies when innovating - R&D Centers & Skunk Works (A4) and International Reputation (A5). Both companies have been investing on improving such assets in order to foster innovation. The lack of R&D tools was a barrier to RI on the case of CA but it is now a strength which can still be improved. On the case of SP we just observe a slight upwards movement of A4 on the 2nd quadrant, when we compare the 2007 matrix with the 2015 matrix of exhibit I (Appendix I). The same movement happens for A5 in both cases, as both companies have always had a very good international reputation that is instrumental to innovate together with top clients.

5.2 Organizational Culture and Structure
As a consequence of all changes and a shift on the leadership in both companies, also the working environments were transformed over the past years. Interviewees from
companies stated that changes on the organizational culture and structure were, and still are, necessary.

Such changes on SP were so significant that a new organizational organigram was designed. Teams at SP are organized according to three main processes, starting with commercial processes (e.g. - customer management), followed by development processes (e.g – engineering/innovation) and ending with the operation processes (e.g. – manufacturing). Commercial activities are developed by client focused teams working in open-space rooms, while development and manufacturing processes are shared by 9 different business units through several transfer processes. Additionally, there are 5 activities (controlling, purchasing, HRM, quality management and IT) which are independent from these three processes flow chart and concentrated at the holding. This is not the case of CA. CA organigram looks more like a hierarchical/mechanistic chain of command where the holding does not perform so many activities. The holding of CA is a small team which is not part of daily activities. Each business unit of CA has its own facilities as well as its own innovation, human resource, IT, quality and efficiency improvement teams. Only a few activities like cork purchasing are shared by the 5 business units of CA. Hence, as cooperation between business units’ teams is much more likely to happen at SP than at CA, one can assume that SP organigrams reflect a culture that shows more inclusiveness and a less hierarchical structure.

The way how teams within the firm interact also depend on how communication is settled. SP has been working on new ways to communicate since 2008. They do so because they believe it is the way to build a more inclusive atmosphere where everyone is focused on the firm’s goals and not on their own individualistic goals. An example of such efforts is the existence of horizontal communication practices like billboards with information about the company values and its 4 years objectives spread through all
production facilities. Nevertheless, communication usually follows the vertical structure of their hierarchical chain of command, reflecting a quite mechanistic organizational stance. The case of CA is quite different. When asked about the internal communication plan of CA, the manager of Amorim Cork Ventures mentioned that there are no real rules or practices besides some guidelines to interact with external entities. People at CA are connected through the vertical structure of its hierarchy in a non-inclusive way. A good example of this is the definition of CA’s mission. It was decided by the board members and it was once communicated to everyone else in the company.

Also relevant is the decision making process which, in the two companies’ cases, is strongly connected with the way how people communicate within firms. When asked about the decision-making process, interviewees from both companies said that it was mostly top-down but also that they have been investing on creating horizontal contribution lines. When one decision needs to be taken, different employees must give their input through vertical communication lines and the final decision must be taken by senior executives. So, managers at the top of hierarchy are who ultimately decide it but, as team members participate on the discussion, they are not entirely excluded from the first part of the process where inputs are accepted. Let’s take strategical planning at CA and SP as an example. In both cases, the strategic plan is defined and redefined during two annual board meetings. However, as each team leader discusses it with their employees beforehand, one can assume that all employees are somehow included on the elaboration of such plan.

Before leaving to the analysis of the newstream, let’s analyze a final landmark of the mainstream. The remuneration system directly affects the way people behave towards innovation goals as well as many others, being that the reason to consider the compensation scheme part of the mainstream. The way people are rewarded for their
innovation efforts at CA and SP is quite different. Every idea at CA is evaluated according to its level of disruptiveness which then defines its economic value. Whoever is part of that new idea management team only gets his or her share if one has exclusively accomplished more than 90% of one’s individual goals. As this is common for everyone, not only for the board members, the remuneration system reflects a quite dynamic structure where innovation can come from everywhere. At SP, the remuneration system compensates the innovation efforts of those who are not part of the R&D team. People from the R&D have a fixed remuneration because, according to SP, they already have all the incentives to innovate. This reflects an inclusive and competitive (dynamic) atmosphere where one gets additional remuneration if he or she looks for the objectives of the firm as one, and not if he or she looks solely to his or her individual goals.

Having analyzed the mainstream, let’s analyze the first landmark of the newstream - “Stretching innovation goals”. SP and CA approaches when defining innovation goals are quite different. SP’s board, along with the teams who interact with clients and suppliers, defines the drivers for the innovation efforts. This process reflects an attitude of exploitation over exploration because innovation at SP converges around such drivers. Therefore, the process for deciding innovation goals is concentrated on a restrict group of people who are on the top of the chain of command, reflecting an environment of segregation of responsibilities under a mechanistic structure. At CA there is no place for innovation goals definition. Innovation is a quite divergent process and everyone can contribute with new ideas. The board has no real control over the stretching of innovation goals even if some challenges are “launched” through the Cork.In program. In fact, Amorim Cork Composites is currently changing all the innovation process in order to explore as much as possible new ideas and to depend as little as possible on the
exploitation of the inputs coming from clients. Therefore, one could conclude that “Stretching innovation goals” at CA reflects an inclusive atmosphere under a quite ambiguous (organic) structure.

A feature of CA Cork.In program, a knowledge management platform, is the possibility to “work on new ideas”. Through such platform, anyone at CA may contribute with any kind of input to develop further new ideas. Moreover, as the process of innovation at CA is quite divergent and as the partners for cooperation scope of CA are very broad, everyone may contribute during this process. As it is so ambiguous, one must consider that there are no real routines and that the hierarchical structure of CA does not really affects this process. The process of working on new ideas at SP is a responsibility of a restrict group of people, the R&D team, who work alongside clients and suppliers. Moreover, the board of SP keeps its control during this phase in order to ensure that this process meets the innovation goals. Therefore, this working on new ideas is an exclusive responsibility of one team under the supervision of a bureaucrat board of managers.

It’s on the idea appraisal and investment decision that the two companies are more alike. In both cases a new idea or project must go through several phases where the decision to continue to invest is taken. SP has established two phases of analysis: “Gate 0” and “Gate 1”. It’s during “Gate 0” that the costs and advantages of developing an idea are assessed. Then comes “Gate 1” which is basically defining how the project will be implemented and under which circumstances it should be done. During all these steps the final decisions are always taken by the board. At CA each business unit has its own practices for deciding on what to invest but they all include the participation of the board of CA. For instances, the board of CA meets on a monthly basis with the innovation team of Amorim Cork Composites to decide in which projects they should
further invest. At Amorim Cork Ventures, the board of CA participates on the final phase of each round of investments and they ultimately decide which startups or projects should be part of Amorim Cork Ventures’ portfolio. So, from these examples one can observe that the evaluation of ideas and projects as well as the investment decisions are very dependent on each company board but the process is more ambiguous on the case of CA and more bureaucratic at SP.

Finally, it is important to discuss about the last part of the innovation process where, on the case of these two companies, new products are developed. New product development is highly dependent on customer and supplier in the case of SP and it is a job developed within the facilities of SP or the facilities of a specific partner of SP. Hence, new product development at SP is an exclusive responsibility of specific teams which are continually being monitored by the board – mechanistic structure under an environment which favors the segregation of responsibilities. At CA there is indeed an intermittent involvement of the board but one can say that new product development comes as a result of the interaction of very different teams. Amorim Cork Ventures is the perfect example on how such interactions are key from the RI point of view. As this business unit of CA does not have its own R&D team, the startups in which they invest may cooperate with R&D teams of other business units of CA but they may also cooperate with any other R&D, as a client of CA or any partner from whom they may profit. Thus, new product development at CA while being a quite divergent and ambiguous process still is significantly controlled by the firm’s board, through monthly status reporting meetings.

Please refer to exhibit III and exhibit IV (Appendix I) to observe, respectively, the location of each mainstream and newstream landmark according to the criteria defined during methodology.
6. Discussion
Based on the findings presented above, and in line with the Sandberg & Aarikka-Stenroos (2014), the results showed that internal barriers to RI depend on the dimension of the firm, the industry and the activities in the innovation process. For instance, SP focus on automotive industry and simpler business model largely shapes the high importance of patents to foster innovation. Given the complexity of CA business model and the cork industry need to enlarge the use of cork, CA approach is rather open to different kinds of cooperation partners and they do not perceive patents as crucial for their success. This approach led this company to diversification and to a significant increase on sales even without patenting every new product.

In line with Skarzynski & Gibson (2008), the cases of CA and SP show that traditional budgeting and resource allocation processes are pervasive barriers to RI, since it hurts the capacity of firms to navigate in ambiguity. Both companies are focused on operational efficiency improvements which traditionally lead to incremental product enhancements. On both companies it was found that there is no “cash-to-burn” to enhance the exploration of new ideas but a controlled allocation of resources which funds exploitation. Along with this barrier comes another important barrier - “monopsony of ideas” – which is related with the fact that only the boards of SP and CA can decide about which ideas should go further and, as they are influenced by their own personal assessment of success (path dependency), the best decisions might not be taken.

Moreover, and in line with what Green & Cluley (2014) predicted about large firms with complex business models, the two firms mainstream activities show that a quite bureaucrat and mechanistic organizational structure as one of the most important barriers to RI. This mechanistic structure favors the segregation of responsibilities and
it hampers radical innovation because it decreases the chances for collaboration as well as the ability to tolerate ambiguous projects. Still, as Bourdieu (1983) predicted, CA newstream activities tended to evolve a more organic and inclusive atmosphere which facilitates cooperation and exploration and enhances the firm’s ability to radically innovate. However, that is not the case of SP. SP newstream activities reflect the same working atmosphere of the mainstream, a quite rigid and vertical structure with a cultural focus on optimizing the existent portfolio of products.

Several studies found that the lack of advanced technical tools, skills and know-how can be a pervasive barrier to RI as well. Both firms have been working on the development of a knowledge management platform, on improving their R&D tools and facilities and, more importantly, on hiring “would be innovators”. **Lack of R&D tools and know-how seem to be barriers that both companies have acknowledged first** and, therefore, they are now one of the strengths of each company’s ability to innovate.

This research also founds that the considered competencies barriers (discovery, incubation and commercialization) largely rely on firm-customer and supplier relationships. The focus of SP on cooperating with clients and suppliers is key for their business. CA’s interviewees had also put a lot of emphasis on this topic when discussing the way they innovate. Both companies work closely with clients and suppliers during the incubation phase which requires not only technological skills but also collaborative and communication skills. A lack of discovery, incubation and commercialization competencies largely affects the ability of these two companies to radically innovate and that is why we observe on the findings a clear structuring of their business around clients. One might wonder about the level of disruptiveness of the ideas coming from these relationships but a large distance between a firm and its customers is a serious barrier to RI. (Sandberg & Aarikka-Stenroos, 2014). Therefore, this study
found that an **undeveloped network and ecosystem may cause substantial damages on a firm ability to radically innovate** as many researchers predicted.

7. **Limitations**
This research has limitations. The interpretive method, the small sample size as well as the tendency of the interviewed company members towards their business practices seriously affect the validity of these Work Project’s conclusions. Moreover, as both companies decided not to provide quantitative information on innovation results, one cannot measure improvement of these companies’ innovation efforts over the past years.

8. **Conclusions**
This study assumed that RI is the only way through which any firm can remain competitive over the long-run. Through three lenses of analysis (organizational resource’s platform, culture and structure) on this study a framework was built to understand which internal barriers are relevant. To do so, five interviews were conducted in order to assess the cases of two Portuguese companies. It seems that the most pervasive barrier is a difficulty to navigate through ambiguity when the expected cash-flows of one project cannot easily be determined. On both companies, it was encountered a focus on efficiency improvement and the existence of a monopoly on the control of investment decisions seriously undermine RI.

Moreover, a rigid organizational structure and a culture which favour exploitation over exploration seem a barrier to RI which both companies find hard to overcome. In an attempt to surpass this barrier, one of the companies (CA) has decided to favour exploration through the creation of its own incubator and the foundation of a business unit which works with non-traditional clients, while the other (SP) decided to improve the degree of cooperation with clients and suppliers. Hence, this study also found that an undeveloped network of cooperation partners can seriously hurt the ability to radically innovate as it affects important innovation competencies, as the incubation and
commercialization ones. Nonetheless, it seems pretty obvious that Portuguese companies have already acknowledged the fact that playing with customers and suppliers when innovating is crucial to their business. To do so, they both have restructured their innovation processes in order to interact with clients and suppliers. This pervasive barrier seems to be no longer a so significant problem in the case of these two Portuguese companies, as cooperating with them such partners seem to be the reason for a significant development of their innovation competencies.

This study concludes that barriers to RI are a complex issue which depends on several factors. Truth is that there is no single right way to organize an enterprise for radical innovation. For example, a highly centralized organization would likely not be very successful at applying Google’s open approach to innovation within its own company. Conversely, Google would hardly apply innovative infrastructure elements that we find at more mechanistic companies. Hence, future research should distinguish contexts when building a systematic approach which can be applied in any company.

9. References

10. Appendix I

Table I: Description of participants, including: name and position in company

<table>
<thead>
<tr>
<th>Company</th>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corticeira Amorim</td>
<td>Paulo Bessa</td>
<td>Managing director at Amorim Cork Ventures</td>
</tr>
<tr>
<td></td>
<td>Susana Silva</td>
<td>Project Manager at Amorim Cork Composites</td>
</tr>
<tr>
<td>Simoldes Plásticos</td>
<td>Júlio Grilo</td>
<td>Engineer Director</td>
</tr>
<tr>
<td></td>
<td>Paulo Bastos</td>
<td>Human Resources Director</td>
</tr>
</tbody>
</table>


Exhibit III: Mainstream landmarks (CA & SP)

2015

Exhibit IV: Newstream landmarks (CA & SP)