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Old and New Challenges

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Introduction

Abstract:

The last-decades business environment's characteristics of uncertainty, high technological innovation rate, and changeable consumer preferences led management literature to investigate the concepts of dynamic capabilities and organizational ambidexterity. Today, as companies progressively rely on mobile, social media, cloud and big data in their business, the very nature of the IT function switches from providing reliable and cost-effective technological support to proactively searching new ways for leveraging technology and creating customer value. For scholars and practitioners alike, the question then arises as to which structures, procedures, and systems organizations may implement to pursue and attain the goals of exploitation and exploration at the IT-level for the best of the entire business. Through a literature review and an explorative case study, this paper seeks to provide insights on the emerging IT models for ambidexterity within today innovative environment, with a focus on the bi-modal model proposed by Gartner. Our findings suggest that the role of IT has expanded beyond the one of a robust infrastructure provider to the one of a strategy and business partner and that this is especially relevant for the achievement and maintenance of ambidexterity. With respect to ambidexterity, our case study suggests that some ambidextrous conflicts at the firm-level are reflected at the IT department micro-level and that organizational models get reshaped throughout application in a learning-by-doing process.

It is still unclear which IT structures, procedures, and systems could effectively and efficiently assist companies in their ongoing struggle between exploration and exploitation, between innovation and efficiency. Further research should be devoted.

In past years often the IT department has been seen as a stand-alone department comprehensible only to information technology experts and insiders. However, IT is necessary for almost all companies' activities on a daily basis, from the most basic to the most complex ones. In fact, development, implementation and usage of information technologies strictly depend on the business necessities. This means that information technologies are shaped not only by the IT department needs but by the company needs, by the business needs, and by the various departments' needs. Along these lines it is crucial to stress strategic exploitation of IT capabilities, which are able to reduce costs,

fasten processes, improve activities, enable opportunities, and consequently boost performance.

In this paper we seek to analyze how the changing environment of today have an impact on IT management. One of the crucial challenges nowadays companies are facing is the challenge of ambidexterity. Ambidexterity is not a new concept since its roots can be found in the second half of the 20th century. However, in the last two decades ambidexterity seems to have impacted the majority off sectors and businesses, diverting new attention on the topic. Tensions between ambidextrous forces got exacerbated by the fast innovative cycles firms are dealing with and by changing technologies. The research moves then to focus on the IT and ambidextrous challenges that the IT has to face and the bimodal IT model recently developed by Gartner analysts. Finally theoretical inferences are coupled with an empirical qualitative research.

In the first chapter we briefly describe the concept of dynamic capabilities which constitutes the basic principle on which ambidexterity literature builds on. We also provide a brief insight about combinative and absorptive capacities.

In the second chapter we investigate the firms' ongoing struggle for exploration and exploitation and from this preamble we move on to the ambidexterity concept. Ambidexterity is analysed with respect to the different ways it has been conceived and to the different managerial solutions that were provided by scholars: sequential, structural, contextual and leadership-based ambidexterity. Then we analyse the main paradoxical conflicts that can be found in the ambidextrous literature, some of which are retrieved in the empirical study.

In the third chapter we first analyze the new perspectives on the business-IT alignment and then we examine the bimodal model brought up by Gartner's analysts.

Finally, in the fourth chapter we develop our empirical study based on the organization internal to an IT department of a French-Italian luxury fashion Company. In the analysis we identify various paradoxes that may challenge the IT mangers from both the strategy and execution point of view and we seek to understand whether these paradoxes are perceived by the IT personnel of the Company and, if yes, how they are resolved.

1. Dynamic Capabilities

Through this first chapter, some brief insights over the concept of dynamic capabilities are provided, since it consists in one of the main background notions which ambidexterity literature departs from.

The goal of the chapter resides in offering a wide-reaching picture about dynamic capabilities' meaning, foundations, and impacts over the development of organizational structures, resources, and routines.

With this aim, we begin by reviewing dynamic capabilities' main definitions and by shortly illustrating the most important theoretical backgrounds at the basis of said definitions. We proceed by delineating the environmental features of turbulence and complexity that have been broadly associated to dynamic capabilities' pursuit need, according to which different levels of dynamic capabilities have been determined and ranked. Then the Teece (2007)'s model is taken into deep analysis in order to provide a clearer connection between companies' structures, processes and activities and the accomplishment of dynamic capabilities. Teece identified sensing, seizing, and reconfiguring as key dynamic capabilities to be looked for by companies for remaining competitive and suggested a number of antecedents and microfundations which dynamic capabilities can be built on. Finally, in seeking to fulfil some theoretical and practical gaps left by Teece's model, we go through the concepts of absorptive capabilities, combinative capabilities, and deliberate learning.

1.1 Definitions and Theoretical Framework

The need of a better understanding of the whys and hows that make certain firms able to build a competitive advantage in environments of rapid change led to the investigation of what nowadays we know as 'dynamic capabilities' (Teece and Pisano, 1994; Teece at al., 1997; Eisendhart and Martin, 2000). From the theoretical point of view, attempts to formalize the dynamic capability approach in strategic management find their roots in different researches undertaken in the past three decades and in particular in the work by Teece et al. (1997), which triggered a stream of studies on the topic.

Despite many scholars having dedicated all or part of their studies to this argument, today theory still lacks of a substantial and shared agreement about the meaning and effectiveness of the dynamic capabilities approach to management and strategy. While some authors consider dynamic capabilities as essential for outperforming competitors, others are more sceptical about their actual powerfulness and believe they do not necessarily provide firms with a competitive advantage. Still others advance a doubt: dynamic capabilities exist but that they are not a real option that managers can pursue since dynamic capabilities cannot be completely generated by managers' actions but involve a certain degree of organizational spontaneity (Winter, 2003).

Principal definitions and theories that can be gathered around the dynamic capabilities concept will be summed up here and some among them will be further analyzed later in the paper.

Teece et al. (1997) define 'dynamic capabilities' as the "firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments". The authors use the term 'dynamic' to emphasize the key role that these capabilities play in enhancing firm's capacity of being reactive to environmental movements, while the term 'capabilities' implies the possibility for managers to shape the development of dynamic capabilities and their disposal through conscious decision making.

This definition seems to mandatorily require firms to be located in an unstable environment to make dynamic capabilities real. However, it is well-understood that organizations do adapt, integrate, and reconfigure their capabilities also in markets characterized by a lower rate of change (Zollo and Winter, 2002). Moreover, Teece et

al. (1997)'s definition implications ask for a relative large-scale unit of analysis of both the mechanisms to be enforced for and the result to be obtained by the dynamic capabilities' effective deployment (Dosi et al., 2003).

Since firm's competencies are strongly linked to the circumstances the organizations create both at the internal and external level, Teece et al. (1997) believe that the roots of dynamic capabilities can be found though an examination of the organizational processes companies have shaped and continue to shape in their struggle for survival and prosperity. In line with this, they suggest strategic management to have a crucial role in identifying ways for the adaptation, integration and reconfiguration of companies' assets, competencies and knowledge, both internal and external, for facing environmental changes, and this implies the most competent use of dynamic capabilities.

Departing from the resource-based view, which conceives firms as a bundle of different resources, and seeking to produce more practical insights over dynamic capabilities theory, Eisenhardt and Martin (2000) define dynamic capabilities as the "organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die." In such a sense, dynamic capabilities blend together a narrower set of capabilities and routines and are the constituent part of firms' processes for the integration and reconfiguration of existing resources, for obtaining and releasing new resources, and for matching or even shaping market changes.

Compared to the definition given by Teece (1997) seen previously, Eisenhardt and Martin (2000)'s one provides managers with a more practical view about what dynamic capabilities are and how they can be created. They suggest that dynamic capabilities are more homogeneous and mouldable than what previously used to be thought since based on organizational routines and processes. Further, they make a distinction between dynamic capabilities in moderately and highly unstable markets. In the former case, dynamic capabilities are stable and analytic processes; in the latter one, they are smooth, fragile and experimental process with unpredictable outcomes.

From this starting point, Winter (2000) develops a hierarchy of capabilities. In the opinion of Winter (2000, 2003) the concept of organizational routines includes the one of organizational capabilities. In this sense, dynamic capabilities are in a subset internal to the bigger set of routines and are defined as "capabilities that operate to extend,

modify or create ordinary capabilities". In Winter's hierarchy of capabilities, the zero-order capabilities are made of those capabilities that allow organizations to survive on a daily basis - such as collecting revenues, standard assembly line activities... -, while by contrast capabilities that allow the organizations to change the markets served and/or to improve the product, the processes or the procedures are above the zero level. Dynamic capabilities are higher-order capabilities that are used to extend, modify, or create ordinary capabilities.

Note that both routines and capabilities imply organizational activities characterized by a certain level of repetition. The extent of repetition depends on whether it is possible to define all the tasks involved in a given activity, or it is only possible to define the process in a broad way, e.g. it is only possible to delineate the proper behaviours to undertake or the most-useful mechanisms for effective decision-making. At low levels, the action and tasks are accomplished in a sort of automatic modality, on the opposite high-level routines implies intentionality and previous experience. (Dosi et al., 2000; Winter, 2003). More than that, Winter (2003) states that firms can implement changes without having to rely on dynamic capabilities, but by the use of what he calls 'ad hoc problem solving', as we are going to explain deeper later in the chapter.

While addressing the issue of learning in terms of experience accumulation, knowledge articulation, and knowledge codification processes, Zollo and Winter (2002) explore which mechanisms organizations should use in order to develop dynamic capabilities. In their opinion, the mix of companies' learning behaviours can be considered as capability-building mechanisms and, in this sense, dynamic capabilities progress and co-evolve with them. Therefore, they define dynamic capabilities as "a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness". In other words, dynamic capabilities are routine activities aimed at the constant adaptation and development of operating routines. Moreover, the terms 'stable pattern' and 'systematically' suggest a persistent structure. In authors' opinion, indeed, disarticulated and fortuitous attempts to adapt to crisis, even if successful, cannot be considered a representation of dynamic capabilities. On the opposite, a firm which is able to reshape its operating processes thanks to a relatively stable pattern of activities committed to process improvement is applying dynamic capabilities.

Finally, Helfat et al. (2007), after an analysis of prior literature, seek to give a comprehensive definition and describe dynamic capabilities as "the capacity of an organization to purposefully create or modify its resource base". With 'resource base' they refer to all tangible, intangible, human resources as well as all the capabilities the firm can rely on or have access to. Moreover, they add a further consideration on the development of dynamic capabilities themselves. Given that dynamic capabilities have the role of reconfiguring and expanding organizations' current resources and that they are also part of the resources the organization owns, dynamic capabilities can modify dynamic capabilities themselves.

Needless to say, these definition and views are complementary and a full appretiation of firm-level capabilities requires an understanding of all of them and more. Here we provide a summary of the definitions offered before.

Table 1: Comparison between Main Dynamic Capabilities' Definitions

Authors	*Unit of interest*	*Definition*	*Key points*
Teece et al. (1997)	Ability to adapt	Ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments.	- Adaptation and proactive responses to change - Unstable environment
Winter (2000, 2003)	High-order routines	Capabilities that operate to extend, modify or create ordinary capabilities.	- Hierarchy of capabilities - Specific investment - Ad hoc problem solving
Eisenhardt and Martin (2000)	Organizational and strategic routines	Organizational and strategic routines to achieve new resource configurations as markets emerge, collide, split, evolve, and die.	- Strategic routines - Specific and identifiable processes
Zollo and Winter (2002)	Pattern of collective learning	A learned and stable pattern of collective activity to systematically generate and modify operating routines in pursuit of improved effectiveness.	- Process of deliberate learning
Helfat et al. (2007)	Comprehensive definition	Capacity to purposefully create or modify its resource base.	- Resources reconfiguration

Source: Personal Elaboration

The last definition by Helfat et al. (2007) is less detailed then the first one given by Teece et al. (1997) since it seeks to capture the many aspects that the literature added to

the concept during the twenty years that separate the works by the two groups of scholars. In sum, dynamic capabilities' main features appear to be:

- Intentionality: dynamic capabilities imply purposeful actions - fortuitous cases and accidents cannot constitute dynamic capabilities (Dosi et al., 2000);
- Repetition: dynamic capabilities are assumed to be characterized by a certain degree of repetitiveness given that they are based on a pattern or pre-existing model derived from learning and experiences (Winter, 2000; Winter, 2003; Helfat et al., 2007);
- Emergence: even if an almost-stable patterns and intentionality are required, dynamic capabilities can be realized through emergent modalities instead of through a complete and detailed plan (Helfat et al., 2007);
- Dynamism: dynamic capabilities imply changes in the environment to be satisfied (Teece et al., 1997; Eisenhardt and Martin, 2000; Teece, 2007);
- Strategy: dynamic capabilities are deployed for strategic changes since they are used to extend or modify the current resource base in order to help companies in the achievement of their goals - differently from low-order routines which do not this transforming capacity (Winter, 2000; Eisenhardt and Martin, 2000; Winter, 2003).

As it might have been evident while reading the various definitions, different theories underpinned the dynamic capability concept. The principal ones are the evolutionary view, the resource-based view, and the knowledge-based view. We believe worth to shortly picture these views focusing on those aspects that had an influence on the dynamic capabilities approach.

The evolutionary theory configures economy and business reality in a mechanism of selection-variation-retention similar to the model Darwin applied in biology. Enterprises are considered generators of variations since they can deploy different strategies and structures and pursue different competitive models. Through their heterogeneity, firms allow markets to undertake the role of selector and only those companies better able to match markets requirements survive. As a result, the most successful business models

are retained and, carefully following their example, organizations develop specific routines to outperform competitors in the economic arena.

The elaboration of the dynamic capability concept asks for an examination of environmental and contextual changes characterizing the economy and the methods companies use for dealing with them. Along these lines, the schools of thought that started the trail toward dynamic capabilities identification (one for all, Nelson and Winter with their "An Evolutionary Theory of Economic Change", 1982) made a reference to the Schumpeterian competition and his 'creative destruction' and emphasized the presence of a sort of Darwinian evolutionary process in economic development. Indeed, the evolutionary model can be considered among the background theories for the dynamic capabilities view for the following reasons:

- The concept of 'natural selection' borrowed from biology and conceived in economy as the processes through which features of organizations, especially those having an impact on the ability to generate output and create profit in spite of environmental changes, are transmitted through firms in time. If on the one side the evolutionary view focuses on the process itself, the dynamic capability approach seeks to identify what companies might do to cope effectively with environmental modifications.
- The notion of routine in evolutionary organizational theories can be assimilated to the concept of capabilities in some dynamic capabilities literature. Nelson and Winter (1982) affirm that if routine definition remains limited to the ordinary meaning of a completely repetitive modality, it is clear that the majority of enterprises' activities will not fit such a definition. However, they say that it might be equally stated that everything that is done by enterprises on a regular and predictable way, can be included in the routine notion. Consequently, all the systems and constant patterns each firm applies while facing also non-routine problems shall be considered routine too. This is not to say that everything is routine. The relevant point is about the predictability of a pattern to occur. If a specific pattern occurs under similar conditions and with similar characteristics, then it is somehow part of an organizational ritual and thus of a routine.

The second school we mentioned is the resource-based view. The resource-based view sustains that the source of competitive advantage lies in the set of resources within enterprises' boundaries (Penrose, 1959). This approach suggests that firms' basis for competitive advantage can be found primarily in the correct deployment and usage of the valuable tangible and intangible resources available to companies. It, then, attempts to give a clearer theoretical structure for understanding how to achieve and how to sustain a competitive advantage.

The main reasons that make the resource-based view one of the basic theories for dynamic capabilities are: the definition of "resource base", the identification of resources as the foundation of competitive advantage, the VRIO framework, and the fact that the dynamic capabilities approach clearly tries to supply an answer to some deficencies of the Resource Based view.

- The organizational resources' definition provided by scholars of the resource-based view constitutes a founding pillar and a matter of discussion for the definition of dynamic capabilities. Some authors comprehend within the meaning of resources all assets, capabilities, firm's characteristics, organizational processes, knowledge etc... under the control of the firm (Barney, 1991). Other scholars, on the opposite, make a distinction between capabilities (or competencies) and resources in the belief that the former should be considered firm-specific and used for building a unique competitive advantage, while the latter are imitable, tradable and not firm-specific. This discrimination in definitions may appear irrelevant, however it is of crucial importance for the concept of capabilities and its development in later literature. The first omni-comprehensive definition is the one adopted by dynamic capability literature.
- The resource-based theory identifies organizational resources as the basis of firm's competitive advantage. This builds up on two main assumptions: heterogeneity of resources and imperfect mobility of resources (Peteraf, 1993). Heterogeneity of resources describes firms as consisting of a bundle of resources unique to each enterprise. In fact, the notion that organizations are mostly heterogeneous in terms of their resources and internal capabilities has long been considered the backbone of strategic management. With regard to imperfect mobility of resources, it states that valuable resources, namely those that

constitute a competitive advantage, are gradually shaped and accumulated within firms and are not tradable. More than that, it is their 'untradeable' feature that makes the achieved competitive advantage sustainable in time. Resources are perfectly immobile if they cannot be traded. For instance, resources which are idiosyncratic to one firm and thus have no other use outside it are perfectly immobile. Differently, imperfectly mobile resources are tradeable but more valuable within the firm that currently employs them than they would be in others. In other words, resources are imperfectly mobile when they are somewhat specialized to firm-specific needs (Williamson, 1979).

- As introduced in the previous paragraph, since rivals could develop some resource able to outperform current firms' resources, sustainability is not a sufficient condition for the maintenance of competitive advantage. The competitive advantage becomes sustainable when organizations' key resources are characterized by the VRIO framework's four features (Barney, 1991). These features refer to the resources' intrinsic aspects and are: value, i.e. the extent to which resources allow the organization to exploit opportunities in the environment while neutralizing external threats; rarity, i.e. the extent to which resources are in the control of a few companies; imitability, i.e. the extent to which resources are difficult to imitate and their development or duplication by other firms implies significant cost disadvantages; organization, i.e. the extent to which the firm is able to exploit the identified resources and capture value from them. The main limit of the model is in its static nature. Indeed, the VRIO framework provides us with a snapshot of firm's resources, a static picture that does not explain the impact of changes in market circumstances nor consider the dynamism within the environment. In other words, the model does not investigate the importance of all those resources, routines and capabilities, which, to use Winter (2000) hierarchy, pertain to the highest order and grant companies the ability to modify or even create new resources when a changing context requires so. The dynamic capability approach seeks then to fulfil this gap.

Finally we listed the knowledge-based view, which takes its roots from the resource based view too. Even if the resource based view includes knowledge as one of the most important resources for firms, defenders of the knowledge-based view sustain that it

does not give to knowledge the proper consideration. Particularly, the resource based view lists knowledge among the other generic resources, without dedicating to it further developments or going deeper in explaining its unique characteristics and distinguishing between the various typologies of knowledge-based competences.

Knowledge management refers to the processes companies use to create, share, use, and manage knowledge and information. It is a multi-disciplinary approach aiming at making firms to achieve their organizational objectives through the best exploitation of knowledge. The knowledge based theory affirms that knowledge is the most strategically relevant resource that enterprises have: knowledge-based resources are typically socially complex and strongly integrated into the organization's activities and people. As such, knowledge is really difficult to imitate and can be considered firm-specific and embedded in each firm. Therefore, superior performances and sustainable competitive advantages have their determinants in firms' heterogeneous knowledge bases and capabilities (Grant, 1996; Dosi et al. 2000). More than that, knowledge is not only the main source of company inimitability, but also the only resource actually able to manage all the other resources and put them in connection. Information technologies may play a major role in the knowledge-based view since information systems can be effectively employed to synthesize, enhance, and share both intra- and inter-firm knowledge.

For what concerns knowledge management literature with reference to dynamic capabilities, particularly interesting is the definition of the cyclical modal shift and of the spiral of knowledge by Nonaka (1991) since it suggest how it might be possible to shape organizational knowledge according to changes in the environment. Indeeed, in Nonaka (1991)'s opinion, the central theme of knowledge management is the dynamic interaction between processes of socialization, knowledge externalization, knowledge combination, and knowledge internalization. Fruitful organizational knowledge creation occurs when the company is able to cyclically shift between these four modalities in an on-going cycle.

Key lessons from the knowledge management school comprise the acknowledge that personnel and cultural norms, which influence employees' behaviours, are an effective instrument for fruitful knowledge generation, dissemination, and utilization; the final recognition that cognitive, social, and organizational learning processes are paramount

to the full accomplishment of knowledge management strategies; and the fact that benchmarking, measurements, and incentives can be applied to push for an acceleration of the learning process and to drive organizational cultural changes.

Table 2: Theoretical Framework underpinning Dynamic Capabilities

School	*View*	*Points of influence*
Evolutionary	The business arena is characterized by a mechanism of selection-variation-retention.	- Natural selection with respect to environment's changes - Concept of routine
Resource-based	The competitive advantage lies in the enterprises' unique set of resources.	- Resource definition - Resources as the source of competitive advantage - Going beyond model's static nature
Knowledge management	Knowledge is enterprises' most strategically relevant resource, unique and untradeable.	- Process for knowledge generation, dissemination, and utilization

Source: Personal Elaboration

As said, throughout the whole dynamic capabilities literature, it is stressed out the role that an unstable environment actually plays the development of dynamic capabilities. Consequently, it seems worth to proceed in the discussion by making some additional considerations on the characteristics and relevant aspects of firms' context for the development of routines and capabilities.

1.2 Environmental complexities and ad hoc problem solving

Environmental complexity, which is given by the level of environmental stability and the extent to which environmental changes can be forecasted, is one of the main dimensions against which companies determine the optimal level of dynamic capabilities they should look for in order to efficiently compete in the market. In a static and stable environment, it might be sufficient for firms to develop operative competences suitable for repetitive processes. In this hypothetical situation, the only capabilities/routines needed are those defined by Winter (2003) as 'zero level' routines that are not dynamic in nature. On the opposite, any time the market requires changes to

be made in the product, target customers, quantities etc... some higher level of routines is necessary and companies have to move into the dynamic sphere of capabilities.

As suggested before, markets can be characterized by different levels of instability. Some markets may develop gradually, slowly replacing dominant technologies and business models. In these cases firms usually have little trouble in adapting to the new rules of the game. However competition may be fierce, and typically companies with an established position have a competitive advantage over the others. In moderately unstable markets changes are more frequent but still modest in size, so that the development can be said to be continuous. As in the case before, companies should not find too difficult adapting to new conditions, however, if they do not remain vigilant, they can easily fall behind. Unstable markets are characterized by sudden and radical changes, which nonetheless do not occur too frequently. Firms riding the wave of novelty, so called rule breakers, will generally have a large advantage over incumbents. Finally, highly unstable markets face radical and frequent changes. Here companies must always be on alert, build new capabilities, expand their knowledge, and being innovative first (De Wit and Meyer, 2010).

In moderately unstable markets, where changes occur frequently but in a highly predictable way and following stable patterns, firms develop their capabilities along repetitive and linear processes, which usually imply an analysis of the overall environment and its likely modifications and concludes with the selection of the proper capabilities to promote. In these markets, even innovation can be successfully pursued through well-structured analytical processes and routines, since most of the times changes occur incrementally. Organizational experience is prescriptive in kind and is usually analytically transposed into adequate and permanent systems of behaviours. Most of the times this transposition implies making the knowledge obtained through practice explicit and codifying it (Zollo and Winter, 2000). In such a sense, processes call for pre-existent practical and theoretical knowledge and build on experience. It might be concluded that in these situations capabilities are path-dependent.

In these markets, dynamic capabilities resemble the traditional description of routines, since they can be interpreted as complex, analytical, linear, and foreseeable processes which largely depend on previous knowledge and experience, on deployment modalities and on the slow advancements required by incremental changes (Eisenhardt and Martin,

2000). In sum, low levels of environmental complexity ask for repetitive routines and incremental capacity of adaptation. By making a reference to Winter (2003) hierarchy of routines/capabilities, it is possible to consider the just described capabilities as dynamic, however, they all pertain to low and medium orders according to the level of stability that characterizes the market.

In more intricate market contexts, identifying proper organizational structures and processes gets difficult since the role of the various actors in the environment becomes less clear and the forecast of market movements very difficult. In this case, experience accumulated through time can even be a liability if the company is not able to change or get rid of it if new conditions arise (Eisenhardt and Martin, 2000; Teece, 2007). In the most variable markets changes are usually competence destroying especially against low-order routines; consequently companies that have invested only in repetitive and fixed responses to the environment may suddenly find themselves at a disadvantage compared to those that have developed higher-order routines (Eisenhardt and Martin, 2000; Winter, 2003).

Are then dynamic capabilities always necessary to face environment changes? In answering this question, we can take as the main reference the study by Winter (2003) who identifies an alternative to dynamic capabilities when specific environment characteristics are satisfied. Winter suggests that this "being unprepared" does not necessarily imply a fault on the organization side. Pursuing dynamic capabilities implies long-term collective effort and high investments. Consequently, before engaging the firm in such a commitment, it is necessary to carefully evaluate the trade-off between the costs for their development and the benefits of the use that is actually possible to derive from them on a relative regular basis. Along these lines, the more frequent the changes the more worth to develop dynamic capabilities.
When the costs are larger than the benefits, companies should not seek to achieve dynamic capabilities. So, what is the alternative?

Winter (2003) introduces the concept of 'ad hoc problem solving' which is a "non routine, not highly patterned and not repetitious" type of behaviour "intendedly rational and not merely reactive or passive". Ad hoc problem solving emerges in front of new unexpected challenges brought up by the environment or other unpredictable events. It

constitutes a way to cope with changes different from the one dynamic capability address. The author expects dynamic capabilities to be pursued when changes occur frequently, even if in unforeseeable ways, while ad hoc problem solving applies when companies believes changes not to take place at a regular pace.

Of course, also in ad hoc problem solving some systems or combinations of mechanism may be learnt and used to have a positive impact on its effectiveness. Similarly, it can be noticed that in organizational improvisation effectiveness frequently emerges from a mix of patterned and experienced performance, a base-floor of micro-patterns that are sequenced and blended together in novel ways. Ways of reacting to highly dynamic environments may even be modelled according to some rules and structural principles. However, even the most incremental effort toward change implementation can encounter unexpected twists that are beyond dynamic capabilities' scope and require ad hoc problem solving to some extent.

The large part of the costs companies have to bear for ad hoc problem solving mechanism goes to zero once the issue is solved. At one extreme, we can think at a hypothetical situation where a firm is able to operate just applying zero-order capabilities, it uses ad hoc problem solving for pursuing changes when needed, and goes back to the initial situation once the change has been successfully implement. This hypothetical reality well-explain the main difference between dynamic capabilities and ad hoc problem solving. The development and maintenance of the former requires an on-going commitment, while the latter just implies a one-shot effort.

One question might arise about why then it is necessary to develop dynamic capabilities at all.

In turbulent environments change is a constant. Consequently ad hoc problem solving will not be enough and a more stable tool becomes necessary for dealing with a constant stream of market movements (Eisenhardt and Martin, 2000). Improvisation stamina must be coupled with more or less stable models, clear patterns, organizational memory and experience. With respect to the level of turbulence to be faced, different patterns and structures might be developed by companies in order to achieve the proper balance between fixed mechanisms and creativity and improvisation (Winter, 2003). In this structure for improvisation dynamic capabilities are to be recognized.

The most effective capabilities for successfully compete in turbulent markets are the dynamic capabilities based on simple guidelines and structures that provide organizations with a course for focusing on important questions while not remaining stock in the past (Eisenhardt and Martin, 2000). Those capabilities pertain to the highest order in Winter's classification. Thanks to dynamic capabilities new knowledge can be generated intentionally in front of an unexpected event also through predefined processes. Experiences and novel insights, indeed, get mixed and reconfigured as so to modify the organization resource base (Zollo and Winter, 2002). Also dynamic capabilities evolve in turbulent markets. They drive the organization toward a careful look at environmental circumstances and its quick interpretation, so that firms can promptly take necessary actions to cope with novel problems, grab new opportunities, and direct learning processes (Eisenhardt and Martin, 2000; Teece, 2007).
In sum, complex changing environments select as most effective those dynamic capabilities that Winter (2003) classify as high-ordered and allow for a smooth management of adaptation and learning. These should be coupled with more detailed mechanisms and routine necessary at the codification of experiences. Finally, reconfiguring capabilities should continuously balance and amalgamate the two.

From previous considerations, a double role emerges for experience in dynamic environments. If, on the one hand, we are used to think to past experience as something that makes companies path-dependent and fixed in their current activities, on the other hand it can acquire new meanings. In turbulent environments, experience and creativity collaborate in the creation and progress of dynamic capabilities, in which experience is, on one side, the depositor of fundamental configurations and general patterns that proved to be useful in most situations, and, on the other, the supporter of resource reconfiguration and transformation and the nurturer of improvisation's power. In this sense, experience instead of having a role in path-dependence, plays a role in path-breaking. Finally, routines are not excluded in turbulent environments. As it may appear obvious, also in unstable markets structured routines are useful and desirable for operations and processes.

1.3 Teece model for Dynamic Capabilities

The first framework aiming at giving a clear structure to dynamic capabilities and to their pursuit was formulated by Teece et al. (1997), who reviewed the model 10 years later seeking to provide more practical insights to managers.

The competitive advantage is conceived by Teece, Pisano and Shuen (1997) as residing on peculiar processes (systems of coordinating and combining) forged by firms' resources and their growth paths. Dynamic capabilities reflect, then, company's ability to reach novel forms of competitive advantages. Along these lines, they identify three main processes through which competitive advantage can be achieved and dynamic capabilities be nurtured. What was defined in the first study as 'processes', in Teece (2007) is defined as 'dynamic capabilities' after the author recognizes their reconfiguration capacities. Here we are going to base our analysis mainly on the later study and we start with a definition of the three paramount dynamic capabilities, namely sensing, seizing, and transforming, and their microfoundations.

1.4.1 Sensing

In unstable markets, it is of outmost importance the ability to asses information, simultaneously recognize threats and opportunities and consequently guide firm's business (Eisenhardt and Martino, 2000; Teece, 2007). Enterprises must undertake an on-going searching and exploring activity across both near and distant markets, invest in research, analyse customer needs and consider all technological possibilities. Moreover, in order for being in the condition of shaping opportunities and understanding them before coming apparent, companies should also understand future demand, the transformations in industries and markets' structures, and the most likely responses of suppliers and competitors. This wide competence was identified firstly by March (1991) as 'exploration', mainly referring to organization learning processes, then it acquires new facets as 'search routine' (Zollo and Winter, 2002), and it is defined as 'sensing' by Teece (2007).

In spite of such a large literature background on the matter, in real life most emerging environment trajectories are difficult to realize for companies. As soon as entrepreneurs and/or managers guess some opportunities, they must determine how new events and

development should be interpreted, which technologies will be needed, and which market segments should be targeted. This implies that sensing has opportunities' scanning aspects as much as learning and interpretive ones. When a new evolutionary path turns evident, often quick reaction is needed.

Companies might enumerate among their employees some individuals with the needed creative and cognitive competences. However, firms cannot afford to totally abandon their sensing capability to the cognitive traits of a small number of people, some analytical mechanisms should be put in place. Indeed, enterprises should develop processes able to internalize the scanning, interpretative, and creative functions at the organizational level, and ensure this processes explore not only local opportunities and threats but also those that might arise at the periphery of their business. For example, firms might shape processes to constantly monitor customer needs, scan competitor activity, gather new technological and scientific information, and look for new products possibilities in order to grasp a full picture of the business ecosystem current situation and future changes. As regard to technologies and opportunities for new processes or products, enterprise R&D activity itself can be considered part of the search activity. Collected insights must then be filtered, and valuable information must proceed toward those able to make sense of it. Organizations can facilitate this process by applying some sort of analytical scheme to the screen of opportunities, so that attention and resources are guided only toward those innovations that make sense to the company, e.g. a detailed strategy can be considered a filter.

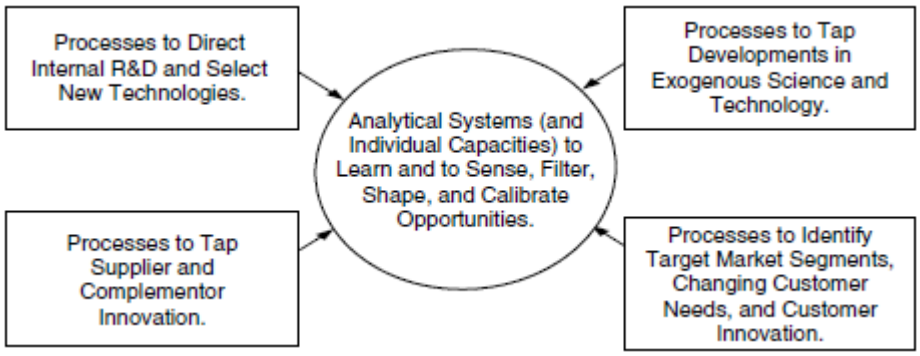
To summarize, Teece (2007) affirms that the sensing capability creation lays in the "scanning, creation, learning, and interpretative" activities and identifies as an antecedent for that a system of analytical processes able to acquire, filter, understand and shape opportunities. With respect to those systems, Teece outlines four main set of processes for the exploration and evaluation of business ecosystem innovations:

1. Processes for the identification of scientific and technological developments, both local and distant, and for the activation and successful maintenance of relationships with pole of innovations, e.g. universities;
2. Processes for better exploiting internal R&D and selecting discoveries;

3. Processes for the identification market segment evolutions screening both customers' needs and technologies to satisfy them;

4. Processes for the identification and evaluation of suppliers and complementors' innovations.

Figure 1: Elements of an ecosystem framework for 'sensing' market and technological opportunities



Source: Teece (2007)

1.4.2 Seizing

After a new opportunity is sensed, it must be addressed through new products, processes, or services. In plain words, companies must be ready to catch an opportunity when they see it. As for sensing, also for seizing we can make a reference to March (1991) and its 'exploitation', which have a very similar meaning to the one Teece (2007) gives to 'seizing'.

Seizing usually implies significant upfront investments in development and commercialization according to the technological or market opportunity identified. However, the issue does not only concern when, where, and how much to invest, it also involves the implementation and appliance of systems for ensuring that the firm will be ready to grab opportunities when they arise. Therefore, companies should maintain and improve their competences and, once the opportunity emerges, invest in those particular competences, technologies and designs most likely to satisfy the market.

Teece (2007) deeply explains the different seizing microfoundations.
Firstly, he suggests that firms should undertake a careful selection with respect to

product architectures, which reflect what managers think customers want, and with respect to business models, which mirrors management ideas about how to match customer needs and gain a profit from that. In short, a business model is a plan for the business structure. Selecting the right business structure requires not just understanding the choices available; it also requires creativity, insight, and a good deal of customer, competitors, complementors, distributors, and supplier information and intelligence. It is crucial to enterprises' survival and growth to be able to create, adjust, and, if necessary, replace business models.

Second, properly setting enterprise boundaries is also important, and can be seen as a factor in getting the business model right. Good boundary setting should ensure that innovation provides more benefits to the company firstly pursuing it rather than to imitators and second movers. Moreover, firm level of integration, both upstream and downstream, has an impact on company capacity to gather information, procure technology, and build critical skills. Failure in this field is correlated with the failure to encourage market developments, especially of complementary technologies, and incomplete capture of the profits made available by innovation.

Third, connected to this topic, we can mention the issue of managing complements and systems of products. The role of complementary assets and cospecialization with respect to innovation development has been widely recognized by today strategic literature. What should be kept in mind is that set of complements many times are connected into a system of products managed by a more powerful company. The distribution of capabilities and their progress between platform actors is crucial. In these contexts, boundary and entry decisions may become problematic and require commitment of the whole system of complements and platforms. More than that, it requires on-going monitoring of system evolution.

Finally, systems should be put in place to avoid, or at least reduce, management bias, deception and hubris. Managerial mistakes in decision making are not that uncommon. In fast-moving environments these errors might damage particularly enterprise since they are likely to have fewer opportunities for recovering. Fortunately companies can enforce mechanisms to try to eliminate biases, such as disciplined approaches to decision making, making aware managers of information asymmetries, promote

external points of view; avoid deception and hubris, such as by not leaving room for self-serving behaviours, increase organizational loyalty. Leadership and top managements has a decisive role in fostering loyalty and commitment and in ensuring adherence to the objectives of efficiency and innovation.

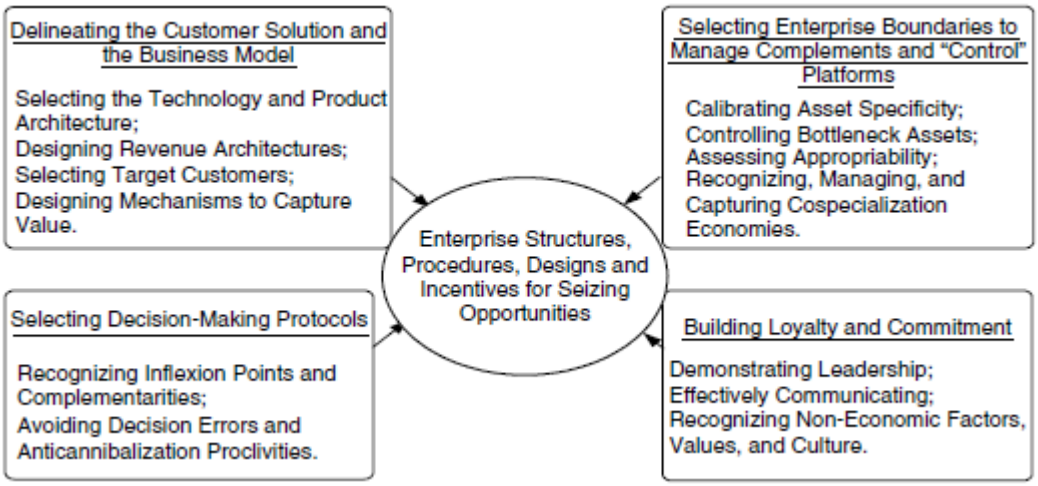
In theory, one could imagine the activities that find out and/or develop opportunities, and those that execute them to be separate. In reality, they cannot be clearly divided and must be integrated on the contrary. More than that, new insights about markets and technologies, particularly those that challenge the conventional organizational point of view, are likely to encounter opposition. The promoters/visionaries must somehow overcome these obstacles and seek some level of managerial consensus for obtaining resources. Therefore, it is not surprising that some companies sense opportunities but fail to seize them.

In sum, seizing consists in the capability of exploiting, appropriating and defending the opportunity for the achievement of competitive advantage. It is seen as the capacity to effectively undertake and use investments toward new technologies and markets and Teece (2007) determine as its antecedents the business models and boundaries, the product architecture and management of its complementors and platforms, and the incentive system.

He again determines four set of microfoundations:

1. Effective business modelling and product offering through the selection of appropriate technology, market segments, and organizational structure.
2. Boundary setting for controlling assets, resources, and skills internal and external to the firm, cospecialize with others and foster systemic innovation.
3. Selecting protocols for decisional processes through the identification of critical points and mechanisms for the elimination of errors in decision making.
4. Building loyalty and commitment thanks to good leadership, communication, culture and values.

Figure 2: Elements for 'seizing' markets and technological opportunities



Source: Teece (2007)

1.4.3 Reconfiguring

The successful assessment and selection of market and technological opportunities, accurate business model design, and the investment of resources into appropriate opportunities can drive companies toward growth and prosperity, and to the expansion in organizational assets and resources.

In order to maintain operational efficiency, it must be remembered that routines are necessary to a certain extent. Once established, the change of routines is costly, but in various situations mandatory. When innovation is incremental, it is likely to be enough to adapt routines and structures step by step. When on the opposite innovation is radical, a complete renovation of the organization could be required with the creation of a new structure and new procedures (Teece, 2000).

The capacity to recombine and reconfigure organizational assets and structures as the enterprise becomes bigger, and as technologies and markets change is paramount to the company's lasting growth. Reconfiguration is necessary to ensure evolutionary fitness and to avoid unfavourable path dependencies. In such a sense, reconfiguration and transforming shows similar aspects to those identified in 'continuous morphing' by Rindova and Kotha (2001). Reconfiguration and redeployment of resources may involve asset-realignment activities, business model redesign, and updating of routines. Top management leadership skills are demanded to support this process of ongoing

assets' orchestration and corporate renewal. Inside the enterprise, the old and the new must be considered complement in order to maximize productive exchange between these two different realities.

The first microfoundation mentioned by Teece refers to firms' internal structures. Each enterprise consists of different subsystems that are simultaneously interdependent and independent. In last decades scholarship supported the benefits of organizational decomposition and decentralization for large companies, starting from the spreading of the multidivisional form, at the disadvantage of the functional form, which allocates decision rights to semi autonomous profit centres. The main rationale at the basis of enterprises' reconfiguration toward decentralization is the promise of a faster recognition of opportunities and threats and consequent action-taking. Of course decentralization must be balanced by integration. In addition, human resource management techniques such as empowerment, decision rights decentralization, teams, flexible task responsibilities and performance-based rewards seem to facilitate companies' ability to keep the pace of innovation. Open innovation is also recognized as benefitting distributed models of innovation where it is useful if not necessary for the company to bypass its own boundaries and access external technology.

Good management of cospecialization, already mentioned for seizing, is also connected to the reconfiguration capacity. Cospecialization can involve two or more assets, or can be of strategy to structure, or of strategy to process. In unstable environments, continuous or at least semi-continuous realignment of these relationships is needed. Traditionally, innovations have generally been considered to be substitutes one of the other, however in practice complementary innovations are of great relevance, especially in the case in which the industry requires incremental or cumulative innovations or when it is characterized by platforms.

Managers should be able to recognize opportunities to invest in cospecialized resources whether built internally or externally, and figure out how to develop and then effectively use combinations specialized and cospecialized assets. By blending together resources adding value to one another, managers create extra value for the firm.

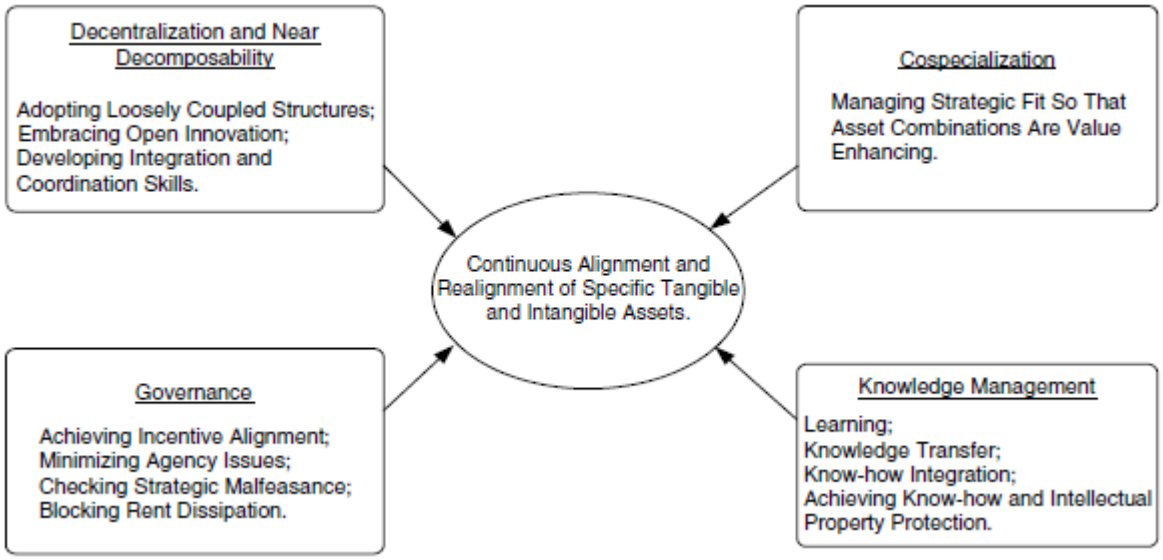
The importance of intangible assets has been widely observed, consequently it has been also outlined how critical might be the proper design of governance and incentive

structures to firm success. Corporate governance and incentive systems should foster company ability to learn and generate new knowledge, which is key to dynamic capabilities. Along these lines, Teece (2007) lists knowledge management among the microfoundation of the transforming capacity, and to some extent for sensing too. Mixing and merging knowledge internal and external to the firm is of particular importance if there are product systems and networks in the industry. The development and appliance of procedures and mechanisms to enhance learning, knowledge-sharing, and knowledge integrating and the presence of good incentive design are likely to be critical to firm performance. In the same manner, it is crucial to monitor and manage possible leakage, misuse, and misappropriation of know-how, trade secrets, and other intellectual property. This requires intervention at the governance level. In the past, the larger part of these issues has been considered within the responsibilities of human resource management; recently a closer connection of these issues to strategic management has been outlined since strategic management should not only take care of creating rents for the company but also of preventing them from being destroyed.

To summarize, transforming is necessary to firms to maintain the evolutionary fitness with the environment and avoid dangerous path-dependencies and negative transfers (Winter, 2003). This capability involves both incremental and radical innovations and organizational realignments, and deals with both tangible and intangible resources. Along these lines, Teece (2007) identifies four sets of microfoundations:

1. Decentralization and decomposability involves balancing divisions and integration, and considering the adoption of loose coupling and open innovation systems.
2. Cospecialization refers to the combination of assets and other resources to create extra value.
3. Knowledge management refers to processes able to foster learning, knowledge transfers and sharing, knowledge integration, and knowledge protection.
4. Good governance involves incentive system design, ensuring low level of rent dissipation, reduction in agency problems and other connected governance issues.

Figure 3: Elements for 'transforming' company's resource base



Source: Teece (2007)

As we will see, the dichotomy between sensing and seizing resembles the one between exploration and exploitation. Teece (2007) somehow downplays this contraposition and leave to the transforming capability the role of allowing for a combination between the two. Along these lines, it is for the correct development and deployment of the transforming capability that the widest microfoundations are identified, such as decentralization and integration, cospecialization and knowledge management.

Drawing from what said, four interrelated factors can be identified, which aggregation mostly shapes the proposed resource transformation construct (Pavlou, 2010).
The first factor is the coordination competence, thought as a dynamic process of managing different knowledge resources to achieve synchronization and integration. Second, absorptive capacity is mentioned, which is conceived by the majority of literature as the dynamic learning process of achieving, internalizing, reshaping, and exploiting knowledge. The third element consists in the organizational collective mind, which refers to the dynamic capacity of exploiting the collective input derived from interrelated activities and people for the benefit of the company and collectively respond and react to rapidly-changing market conditions. Finally, entrepreneurial alertness is the fourth factor taken into consideration, described as the dynamic ability to recognize opportunities and gain insights on market situation. These four distinct, yet

related and mutually reinforcing capacities may be though as best practices for reconfiguring resources and adapting to unstable environments, even if not exhausting, and are consistent with the processes identified by Teece (2007). Resource reconfigurability is here seen as a higher-order phenomenon realized thanks to the effective appliance and interaction of the proposed four lower-order capabilities (coordination competence, absorptive capacity, collective mind, entrepreneurial alertness).

1.5 Knowledge Management Capability

As said, transforming capability includes the capacity of making proper use of knowledge. In this sense, a deeper explanation of knowledge management, absorptive capabilities and combinative capabilities is needed. In addition, we will also deliberate learning which lies down a model for knowledge management that aims at promoting dynamic capabilities at the organizational level.

1.5.1 Combinative capability, absorptive capacity, knowledge management

We already pointed out that companies can achieve new competences by combining existing ones. Competences that realize such a resource-merging process are known as 'combinative capabilities'. Scholars have identified two main antecedents for this process: one consists in the external acquisition of knowledge, obtained for instance through the hiring of new personnel, through joint ventures etc, while the other one consists in internal learning made possible by experimentations, management effort, accidents etc...

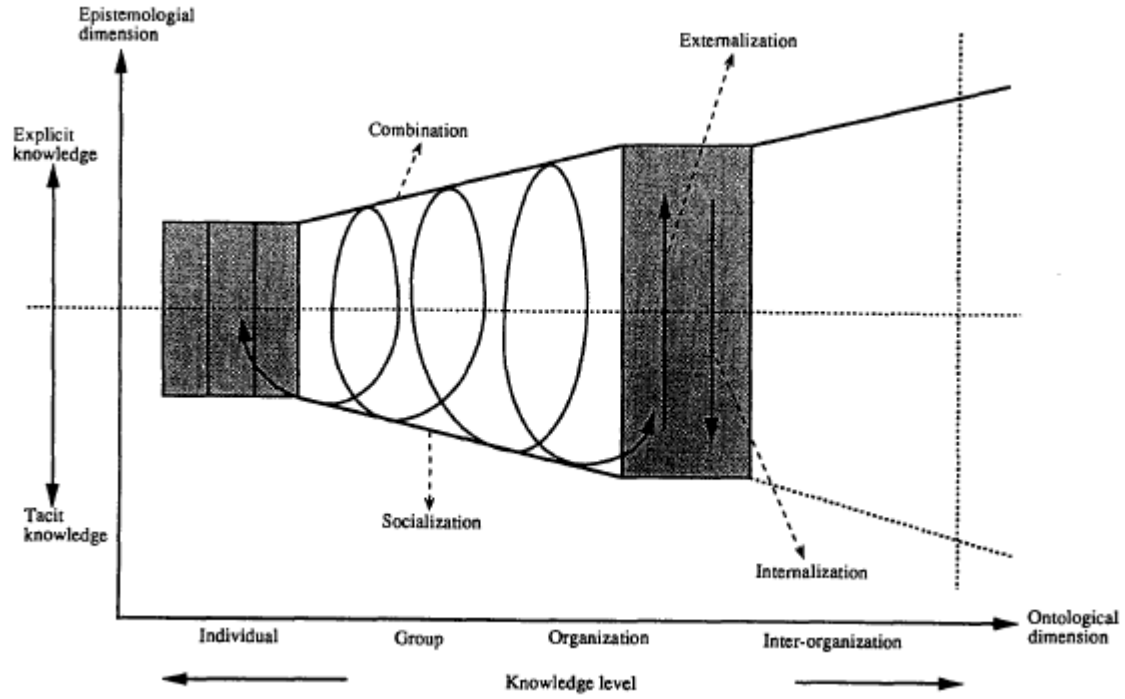
Nonaka (1994) identifies four main phases that are useful to the combination of different knowledge sources:

- Socialization: the sharing and diffusion of tacit knowledge through interaction between individuals,
- Externalization: the conversion of tacit knowledge in explicit one;
- Combination: the sharing of so-obtained explicit knowledge through mechanism of dialogue and interaction;

❖ Internalization: the explicit knowledge gets again converted in tacit knowledge internal to individuals that have participated to the process.

Knowledge creation builds on both tacit and explicit knowledge and, more importantly, on the interaction and interchange between these two types of knowledge through externalization and internalization. This is necessary for the knowledge to move from being 'individual' to being 'organizational'.

Figure 4: Process of Organizational Knowledge



Source: Nonaka (1994)

'Absorptive capacity' is defined by Cohen and Levinthal (1990) as the "ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends." This definition assumes exploration and exploitation as antecedents of the firm's absorptive capacity. More than that, the authors recognize in the knowledge already in the hand of the organization the main base for the recognition, assimilation and exploitation of new knowledge. Later in the literature, other identified antecedents are: the level of social interaction, decentralization of information, existence of knowledge management mechanisms (such us workgroups), sharing of a common enterprise language etc... In its evolution the concept has encompassed the acquisition

and assimilation of new knowledge, considered as the potential absorptive capability, and the transformation and exploitation of new knowledge, considered as the realized of absorptive capability.

The contribution of the knowledge management school to dynamic capabilities is significant given its studies about the organizational structure which best allows for the development of critical knowledge and about the various tools that can be applied to improve firm knowledge management. Moreover, it takes into account the dichotomy between exploration and exploitation at the knowledge management level.

In the '90s, Nonaka et al. (1992) and Nonaka (1994) identify in the 'hypertext organization' an ideal organization able to promote and sustain combinative capabilities and absorptive capacity. The hypertext organization is conceived by the authors as made of three levels. The first one is represented by the company knowledge base which consists of tacit and explicit knowledge available to the enterprise. The second one is given by the company business system, intended as system of operative routines which constitutes the bureaucratic side of the enterprise. The third level consists of project teams which self-organize themselves in order to create and acquire knowledge. To ensure sharing of knowledge, project teams should be interconnected through a system of loosely coupled ties and knowledge transfer should be transversal between all levels. Along these lines, the hypertext organization model distinguishes between standard operations and routines, which are performed by the formal and hierarchical component of firms, and knowledge creation, which is performed by project teams. In authors' opinion, this structure is able to combine the efficiency and stability of bureaucracy, and the dynamism and creativity of cross-functional task forces.

In addition, the knowledge management school has also identified through practical studies a series of tools and mechanism to be used in enterprises - such as already mentioned task forces, knowledge brokers, competence management systems, mentoring, organizational repository of memory etc - which should enhance knowledge creation, acquisition, replication, transformation, and sharing.

In sum, on the one side it can be noticed an evident linkage between the processes for accumulation and assimilation and those of reconfiguration and transformation with the dimensions of exploitation and exploration, on the other side knowledge management

add to that a model and a series of mechanism for the diffusion, internalization, and replication of knowledge. Moreover, the importance given to the enterprise's knowledge drives attention to prior expertise and experience.

1.5.2 Deliberate learning

The study by Zollo and Winter (2002) investigates the issue of deliberate learning while analyzing dynamic capabilities. It examines the role that experience accumulation, knowledge articulation, and knowledge codification processes play in the evolution of both dynamic and operational routines. Authors affirm that the coevolution of these learning mechanisms is what actually shapes dynamic capabilities.

The base for deliberate learning and dynamic capabilities' generation is to be found in organizational experience. Once a certain level of experience and know-how is reached, companies should evaluate whether the accumulated knowledge should be shared and explicitated among various organizational members. This evaluation is done with respect to the frequency with which the experience and know-how in examine have been useful, the heterogeneity of the circumstances in which they have been successfully applied, and the extent to which there is a clear link between the action taken and the final output, namely the level of causal ambiguity between the deployment of the experienced know-how and the final performance.

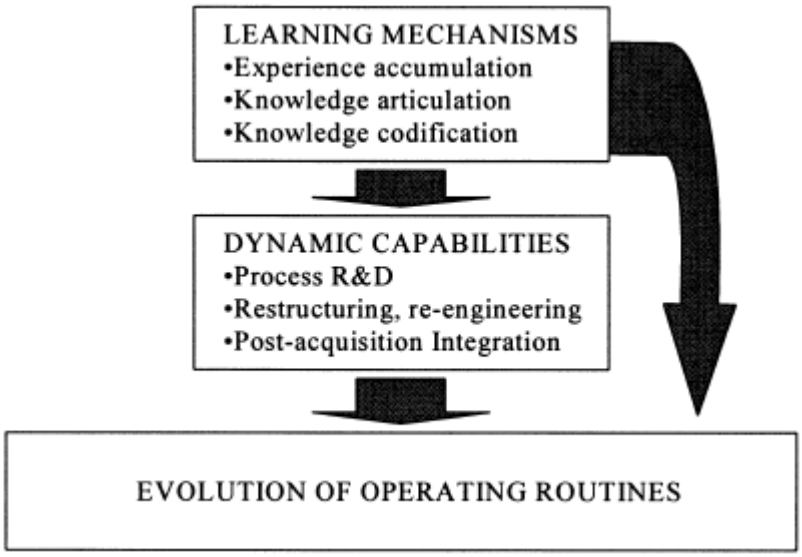
During their life, companies always have to adopt some systems and mechanism for building their own capabilities. Here we took into analysis the mix of learning behaviours they apply, which consists of semiautomatic experience accumulation and of deliberate investments in mechanisms for knowledge articulation and codification, and their relative effectiveness.

The experiential process of learning by doing is considered by Zollo and Winter (2002) relatively passive with respect to the more intentional and deliberate activities targeting knowledge articulation and codification, since the former is based more on practice and the latter on cognitive processes. These learning mechanisms are needed to allow the ongoing existence and functionality in time of two different types of organizational activities: one focused on the operational effectiveness of the firm (both staff and line activities), which can be acknowledge as operating routines; the other directed toward

the modification of operating routines themselves, which can be identified in dynamic capabilities.

Dynamic capabilities, therefore, are described as enterprises systematic methods for altering operating routines. By that, it follows that learning processes constitute not only the base for dynamic capability shaping but also for routine shaping. According to the degree to which firms build and undertake learning processes in a mechanic and systematic way, they could be referred to as second order dynamic capabilities.

Figure 5: Interaction between learning mechanisms and dynamic capabilities for routines shaping



Source: Zollo and Winter (2002)

The question we necessarily have to ask is: what learning processes concur for the generation and development of dynamic capabilities?

Authors, starting from an analysis of the organizational learning phenomenon, blend together the behavioural and cognitive approaches and take into account not only the informal and semi-unconscious experience accumulation process but also the formal cognitive processes of articulation and codification of knowledge of accrued experience. We are going to explain each of the phases.

Concerning knowledge accumulation the authors make a reference to two sets of routines: the first set consists in the implementation of routines already known to be effective under the current instances for gaining a profit, and the second set consists of those mechanisms the company use to remain vigilant and, if necessary, to apply desirable improvements to current operating routines. The activities in the latter group

are known as search routines and are needed to ensure company's ability to make profit in the future. Each group has a different impact on the creation and appropriation of rent and is more or less effective in providing a profit depending on the overall circumstances. Enterprises evaluate the extent to which it is worth to develop more one or the other type of the two sets of routines depending on the rhythm of changes in the environment.

Experience accumulation refers to the learning mechanism through which operating routines are developed and improved, and stays at the foundation of the other two learning mechanisms we are going to see. The creation by firms of clear patterns for experience accumulation, e.g. learning by doing and trial and error processes, experimentation, prototyping etc..., is seen by large part of the literature as the heart of the development of new and existing capabilities (Eisenhardt and Martin, 2000; Winter, 2000; Zollo and Winter, 2002; Teece, 2007).

Knowledge articulation is critical to collective learning. Important collective learning mechanisms could be for instance the sharing of individuals' opinions and experience, the engagement in constructive discussions, the confrontations between knowledgeable employees and the fruitful challenging of each other's viewpoints. Moreover, through these processes organizational members are likely to gather a higher level of understanding of the casual links between the different activities and, consequently, they can better realize the impact they have on the others' and overall performance. This usually implies an improvement in employees' effort and competences.

The second process is, therefore, crucial to the development of collective competences, and is described as the set of mechanisms and procedures through which implicit knowledge is articulated through debriefing sessions, meetings, collective discussion, and performance evaluation processes. Thanks to the individual experience distribution among employees and the comparison of colleagues viewpoints and insights, articulation efforts can allow for the recognition of possible improvement in activities and lead organizational members to a deeper understanding of new and changing links between different actions and between actions and performance, and hence can result in improvement to existing routines or in the outlining of the need for more fundamental research and, in case, change.

An even larger cognitive effort is required when individuals are asked to codify internal routines and their comprehension of routines' performance implications in written tools, such as manuals, handbooks, spreadsheets, decision support systems, project management software, etc.

The knowledge codification process has necessarily to be undertaken after knowledge articulation. Indeed, without the accurate expression of tacit knowledge, knowledge codification cannot occur, on the contrary the opposite is not true. In spite of the many benefits of knowledge codification, companies do not use this mechanism very often. This is due to the additional costs to bear for the learning effort to move beyond a simple sharing of individual know-how and accumulated experience to writing manuals and developing other process-specific tools.

The literature has outlined how the codification fosters the diffusion of existing knowledge (Winter, 1987; Nonaka, 1994). Indeed, the major benefits of knowledge codification have typically been identified into the distribution and replication of best routines, which comes from the successful utilization of manuals and similar instruments. However, this view does not consider some more important learning benefits that can be derived from the creation of these tools, such improved coordination between complex activities, or the recognition of a need for routines' adjustments. In order to write a manual illustrating the best way of executing a complex task, the individuals taking part to the process must firstly create to themselves a mental map of what actions are to be selected and implement under what conditions. By going through that effort, they are most likely to obtain a clearer definition of what works, what does not work, and why. In spite of the initial goals motivating the codification activity, the process through which codification tools are made and successively consistently updated implies an effort to figure out more precisely the causal links between the decisions to be made, the actions to be picked up, and the performance outcomes to be expected. The cognitive simplification implied in the act of synthesizing a system of tasks into a coherent body of instructions can therefore lead companies a significant bunch of benefits. Codification, therefore, can be regarded as a critical supporting mechanism for the entire knowledge evolution process, and not just for the transfer phase, since it can, for example, help the emergence of new proposals to change current routines, likewise it can facilitate the recognition of the strengths and the

weaknesses in proposed variations. Knowledge codification not only diffuse the organizational members' 'know-how' but also their 'know-why'.

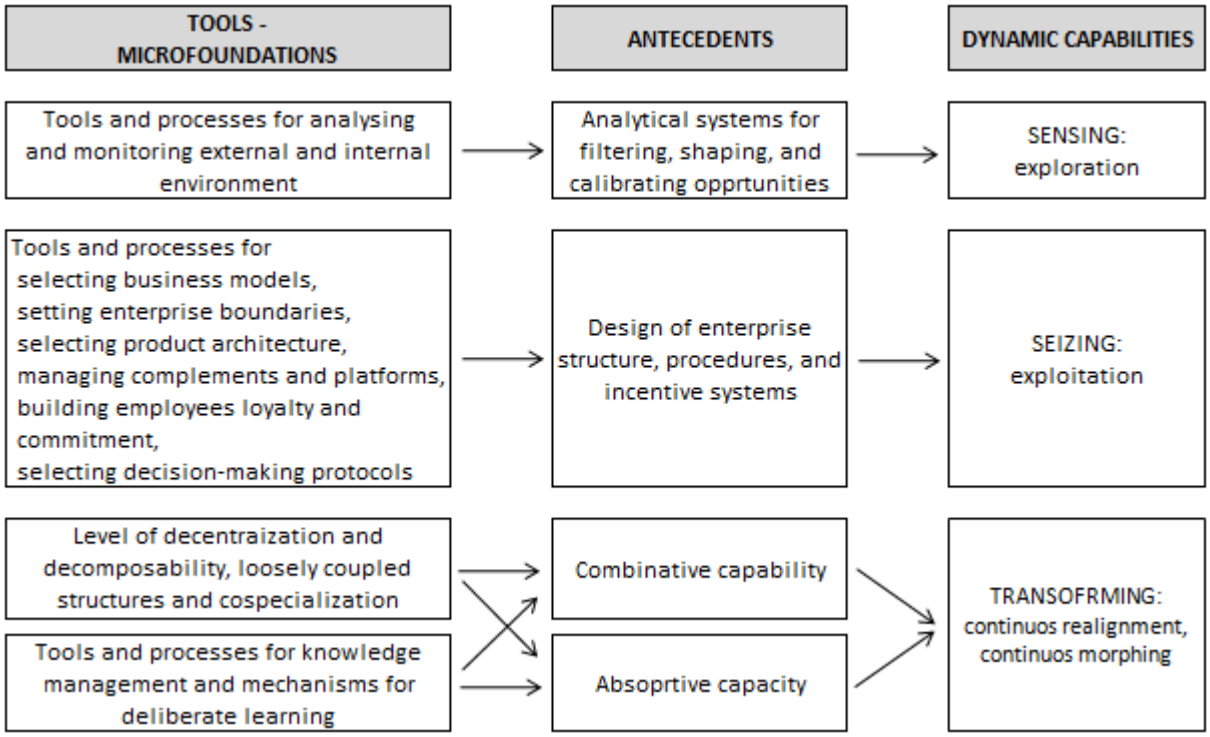
Of course, these advantages do not come at zero cost. Direct costs of the codification process include the resources exploited, the time used, and the managerial attention invested in the creation and to be invested in the updating of task-specific instructions, while among indirect costs we can mention the possibility of an increase in the rate of inappropriate implementation of routines in the event the codification has been poorly performed, a more general increase in organizational inertia due to the structuring and formalization of activities execution, or the risk of misappropriation of our know-how by other companies since codified knowledge is well-known to be easier to imitate. Instead of rejecting knowledge codification process as a whole as generator of inertia and supporter of negative path dependence, companies should focus on making real the conditions under which the learning and diffusion advantages attached to codification can be fully realized outperforming its costs.

One provocative implication of the analysis is the authors' suggestion that knowledge codification (and to a lower level knowledge articulation) processes become a mechanism of superior importance with respect to the accumulation of expertise as the frequency and the homogeneity of the tasks in examine are reduced. Authors, therefore, conclude that the process of new knowledge generation is facilitated when enterprises activate mechanisms for knowledge articulation and codification. This requires an organizational systematic learning-oriented approach and the application of deliberate learning procedures.

1.5 Conclusions

The model described by Teece appears to be complete and almost omni-comprehensive. Here, we would like to provide a further schema, seeking to integrate the Teece's model with the other considerations we drew from previously recalled literature while trying to clearify the distinction between microfoundations and direct antecedents of identified dynamic capabilities.

Figure 6: Microfoundations, antecedents and dynamic capabilities schema



Source: Personal elaboration.

In the above schema, the model is structured in three rows, one of each dynamic capabilities identified by Teece (2007), and in three columns, one listing microfoundations' tools, one for the antecedents, and one for dynamic capabilities. In the first column it is possible to find some of the mechanisms and processes which, as previously shown, are considered to have an impact on the implementation and effectiveness of specific systems and competences, while in the second column are

listed those capabilities that, as antecedents, have a direct impact on dynamic capabilities development.

For what concerns sensing, we comprehend in its microfoundations' tools all those processes and procedures that companies can use when seeking to examine and evaluate overall circumstances, departing from the environment analysis for the identification of opportunities and threats, to the development of different scenarios and consequent possible reactions, from firm internal appraisal to management control systems. These tools allow for the proper recognition and selection of opportunities to be exploited by the firm in subsequent phases.

With respect to seizing, we keep those instruments and patterns already indicated by Teece, namely all those tools and derived structures that will make the organization to effectively exploit chosen opportunities and gain a profit.

Regarding to the transforming capability, after the literature review, we preferred to focus more on those organizational mechanisms, such as loose coupling and cospecialization, which aim at making the firm more flexible and able to adapt and realign its assets, as well as on those mechanisms that facilitate a systematic approach toward learning and its best organizational use. Along this line, we connected the combinative capacity mainly to the decentralization and loose coupled systems, since they should simultaneously lead to empowerment of all organizational members and enough integration to outline useful combination of resources. While we mainly associated the absorptive capacity to systems of knowledge management and deliberate learning since they should lead to the maximum assimilation of experience. Nonetheless, it cannot be denied that all these microfoundations concur in the development of both combinative and dynamic capabilities, arrows have been depicted consequently.

A final consideration is worth with respect to the fact that this model stills lack of a proper solution of the integration of the opposite tasks of sensing, as exploration, and seizing, as exploitation. The missing piece is provided by the studies on ambidexterity and ambidextrous organization, which in fact will be the topic of our next chapter.

2. Ambidexterity

How organizations can find a balance between sensing and seizing (Teece, 2007), exploration and exploitation (March, 1991; Gupta et al., 2006), search depth and search scope (Katila and Ahuja, 2002)? Going further, how it is possible to fruitfully combine so different activities? The answer that was given by scholars and management is: pursuing ambidexterity. Organizational ambidexterity refers to firms' ability to be efficient in current business and also be adaptable to cope with future changing demand. In other words, organizational ambidexterity refers to firms' ability to deploy both exploitation and exploration techniques successfully.

So far, literature has placed particular emphasis on three main ambidextrous approaches that should allow companies to balance exploitation and exploration simultaneously: the structural approach in which activities are performed in different units within the company; the contextual approach which emphasizes the design of a proper organizational context; and the leadership approach which suggests that top-management should be responsible for properly weight exploitation-exploration interplay.

In parallel to simultaneous ambidexterity, another approach developed during past decades: sequential ambidexterity, in which exploitation and exploration are undertaken by companies at different moments of their life and, in this manner, the equilibrium is found through time.

In addition, it can be noticed that ambidexterity has been an important topic in many economical fields such as innovation, organizational theory, strategic management, and organizational learning. Under all these perspectives, eminent scholars stated that ambidexterity is a paramount prerequisite for firms' survival and success, and they all contribute in providing an all-inclusive view.

Nowadays literature focuses its attention on the relationship between an ambidextrous organizational design and the performance of different enterprises.

In this chapter we describe enterprises' struggle among exploitative and explorative forces and explain the mentioned four approaches for achieving organizational ambidexterity simultaneously and sequentially.

2.1 Exploitation versus Exploration

As we previously briefly mentioned, the absorptive capabilities and the combinative capabilities allow organizations that look for innovation to simultaneously pursue two critical but different activities: exploitation and exploration. How to practically accomplish both and how to find a proper balance between the two is anything but easy. James G. March is the first scholar who gave to this issue the attention it deserves. He defines the process of exploration as comprehending research, variations, experimentation, risk, flexibility, discovery, and innovation. Differently, the process of exploitation consists of efficiency, productivity, activities' refinement, selection, implementation, and execution (March, 1991).

In papers on organizational learning, the problem of balancing exploitation and exploration is usually exhibited by distinguishing between the refinement of an existing technology and the invention of a new one.

There are good reasons why the literature got so concerned about this trade off. By making investments only for the benefit of exploration revenues from successful innovations risk not to outweigh their costs; while by focusing exclusively on exploitation activities companies risk to remain locked in old sub-optimal or even declining businesses. Companies decide how to distribute their resources on the basis of their return experience. There is a tendency, in fact, to allocate more resources into exploitative activities. This is due to the nature of exploitation benefits to business: they are usually visible almost immediately and cumulative through time. Each improvement in competences useful to a specific task, increase the likelihood for that task to be performed more quickly and easily and, more than that, with a lower level of effort and cost. This makes the organization prone to repeat investments in exploitation. On the contrary, exploration reduces the pace at which existing capacities are adjusted and upgraded, and divert organizational members' attention toward projects with unsecure return but sure costs. The trade off is exacerbated by the temporal and spatial proximity within which the two activities should be undertaken. However, companies' survival in the long run depends mostly on the organizational capacity to keep exploration at a steady level and remain vigilant toward switches in the market. Focusing only on exploitation may even lead to company self-destruction.

March (1991) model describes the relationship that exists between exploitation and exploration and knowledge spreading within companies. In order to do so, the author takes in examine two distinctive aspects of the context in which firms operate: the mutual learning in the development of knowledge between the organization and its members, and the competitive ecology in which companies learn and use their knowledge.

With respect to the first aspect, namely mutual learning between organizations and their members, March sustains that organizational knowledge consists of all those rules and procedures which accumulate through time thanks to organizational members and diffuse between organizational members through various typologies of induction and education processes. It must be noticed that individuals are not passive with respect to rules and procedures, companies' knowledge is shaped by and adapted to their beliefs and ideas.

March proposes a model with four key features in dealing with this issue:

1 Feature: An external reality of m dimensions, independent from individuals' and organizations' beliefs, which has a value of 1 or -1.

2 Feature: For each of the m dimensions, n individuals and organizations held their beliefs about. Each belief has a value of 1, 0, or -1.

3 Feature: Individuals change their beliefs with respect to the organizational code through the socialization process with probability p_1. p_1 is a parameter for socialization effectiveness.

4 Feature: Vice versa, organizational codes adapt to individuals' beliefs with probability p_2. p_2 is a parameter for code learning effectiveness.

At the beginning the organizational code is neutral with respect to the different dimensions of reality and individuals have various beliefs but no proper knowledge. In the development of the mutual learning process, the progress in knowledge occurs through the imitation by the code of the beliefs of some superior individuals (not necessarily right beliefs), and then by the imitation of the code by the other individuals. The probability that organizational members will actually change their beliefs, p_1, depends on the level of agreement between the superior individuals. Unfortunately, March does not provide clear explanations about the aspects that make a person

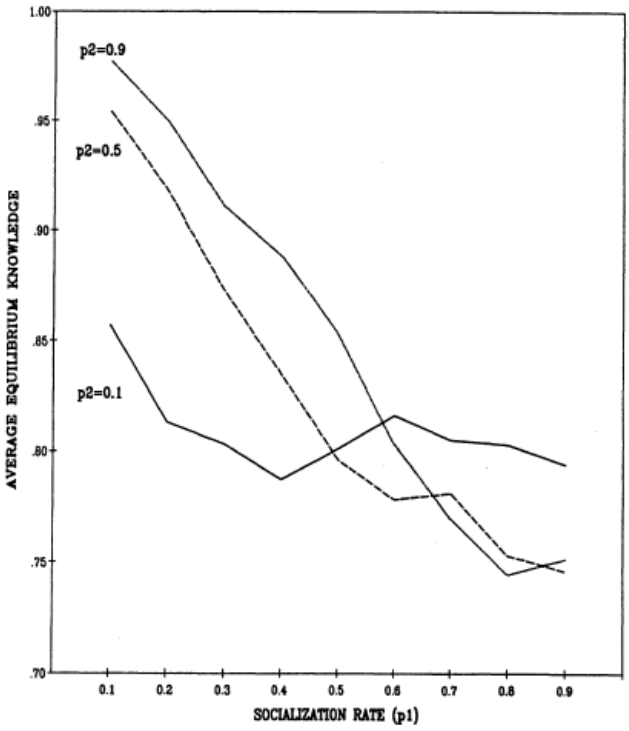
‘superior’ nor about the way in which superior individual beliefs are transferred into the code. The equilibrium is reached when firm’s members and firm’s code have the same beliefs about all reality dimensions.

In order to verify the effects of mutual learning under different conditions, March distinguishes between a closed system and an open system. Closed systems are characterized by a fixed number of organizational members and a stable reality. Open systems are described as having a variable number of members and being in an unstable reality.

We first consider a closed system, where the cognitive equilibrium is given by the already mentioned socialization effectiveness p_1 and code learning effectiveness p_2. As shown in the figure below, March affirms that when p_1 is low, in figure $p_1 = 0.1$, the knowledge at the equilibrium is higher if p_2 is high. In words, when the convergence between the organizational code and individuals’ beliefs in slow, the level of knowledge at the equilibrium is higher if the code learns quickly from individuals.
On the opposite, if p_1 is high, in figure $p_1 = 0.9$, the level of knowledge at the equilibrium is higher if p_2 is low. In words, when people socialize and speedily assimilate the code, the equilibrium knowledge is higher if the code learns slowly. Overall, it is possible to affirm that the highest equilibrium knowledge is obtained when individuals learn slowly from the code but the code learns quickly from individuals.

Hence, in March’s opinion fast learning individuals are not always the best option. Having some ‘slow learners’ allows different ideas and competences to remain in the company longer at the advantage of exploration and average knowledge expansion. Along these lines, individuals who are able to assimilate the code at a low pace can be extremely useful for organizational cognitive process. If all firm’s members conform immediately to the code, the company does not remain vigilant against wrong beliefs. In other words, slow learners will promote a certain level of exploration, while the too strong adherence to organizational code will lead to inertia.

Figure 7: Effect of Learning Rates (p_1, p_2) on Equilibrium Knowledge



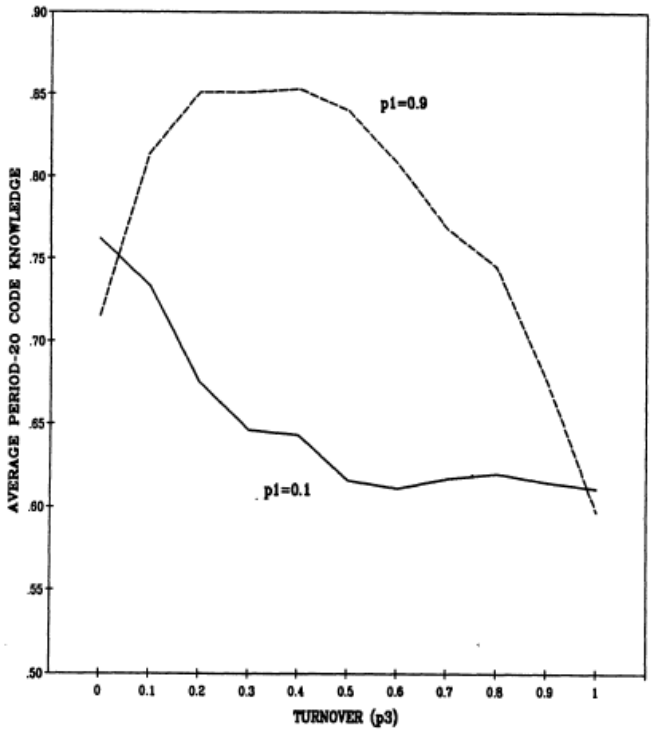
Source: March (1991)

Now we take into examine an open system. If in a closed system what creates variety in knowledge is low socialization effectiveness, in an open system we can consider an additional factor:

5 Feature: Level of turnover, which reflects the probability p_3 that some individuals leave the organization.

When p_1 is low and p_3 is high, p_2 is low. In words, a low level of socialization and high level of turnover decrease the code learning and lead to lower exploitative capacities. On the opposite, when socialization effectiveness is high, a moderate level of turnover improves organizational knowledge. Indeed, new hirers have beliefs different from the code ones and this allows the company to explore new points of view and expand its aggregate knowledge.

Figure 8: Effect of Turnover (p_3) and Socialization Rate (p_1) on Code Knowledge



Source: March (1991)

But turnover is not the only factor to be considered in an open system, also environmental turbulences create cognitive variety:

6 Feature: The probability p_4 that a given reality dimension shifts in a given period.

Generally, in a turbulent context organizational knowledge decreases when turnover is low since the firm's code becomes detached from reality. Strict mutual learning might consequently damage enterprises. March sustains that in an unstable environment a moderate level of turnover grant the organization to keep a steady level of knowledge. Indeed, the recruitment usually replaces outgoing employees with individuals having distinctive capacities which facilitate exploration.

As said, the author takes into consideration another aspect of firms' context: the competitive ecology in which companies learn and use their knowledge. In the competitive ecology, learning level of one firm depends on the learning of all the others. In particular, the author affirms that the key for a lasting competitive advantage is in exploration. Furthermore, March suggests that it would be better for companies to have

a lower level of average knowledge and a greater variety. Indeed, an excessively high level of knowledge might reduce exploration and lock the company in sub-optimal equilibria. Moreover, it is not always said that the benefits of exploitation exceed those of exploration in dynamic competitions.

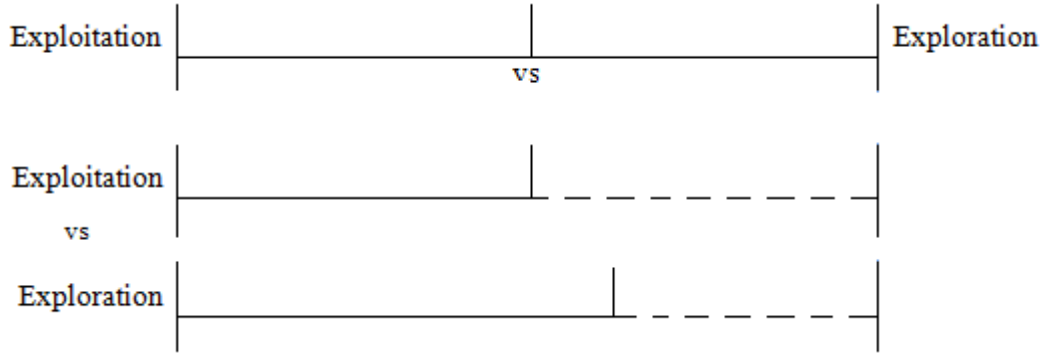
Following March's analysis, we can affirm that cognitive heterogeneity within organizations is determined by low socialization, moderate turnover, moderate environmental turbulences, and competition. Each of these factors implies a trade-off between the pursuit of exploration and exploitation. Even though exploitation typically leads to return nearer in time, companies should remember that innovation is the engine of today business and, as so, exploration should always remain a focus for competitive advantage.

In some of its inferences March's model might be too extreme and abstract. When speaking about how 'low learners' not applying the code could actually improve organizational knowledge, the author does not mention the implications that conformism in fact has on firms' members. It is evident that if the learning rate could be chosen by individuals, they will not prefer to learn slowly for benefitting overall knowledge, especially since careers are usually easier for fast learners. Another theoretical yet not strictly practical consideration is made with respect to turnovers in turbulent markets. March promotes relatively high level of turnover in such environments, which will expand firm's knowledge and lead to prosperity. However, it is evident that people within prosperous organization are likely to want to keep their job there, consequently reducing the level of turnover and the space of new hirers. In sum, some of March's considerations might be too abstract, but his model remains of great value as one of the first studies on the dichotomy between exploration and exploration coupled with some practical insights on how to foster the latter, and as a trigger of subsequent researches.

March (1991) analyzed the struggle between exploration and exploitation as a trade off choice between two activities: it is necessary to give up some of the exploitative activities in order to being able to promote exploration. Exploitation and exploration are cannot be fostered with the same emphasis at the same time. Along this line, exploration

and exploitation can be visualized as two extreme of the same which compete for the same resources.

Figure 9: Exploration-Exploitation on One Dimension; Exploration-Exploitation on Two Dimensions



Source: Personal Elaboration

Differently, Katila and Ahuja (2002) investigate exploration and exploitation as two different dimensions, instead of two aspects on the same spectrum, so that companies can vary in the extent they want to pursue each of them independently. In this way the trade off is somehow less exacerbated as compared to the March (1991) model. Katila and Ahuja (2002) call one of these dimensions 'search depth', which reflects the extent to which firms reuse and revisit prior knowledge, and the other 'search scope', which indicated the extent firms explore new solutions and look for new knowledge. Through an analysis of the robotics sector, the authors suggest both search scope and search depth to have an impact on firms' ability to create new products. Their study also widen the work on dynamic capabilities since it reframes the 'problem solving' capability of firms through search.

The organization can benefit from search depth for three main reasons. First, the repetitive usage of same knowledge facilitates the development of routines and reduces errors. Second, the company is more familiar with the knowledge to be looked for, thus it knows the prerequisites this knowledge should have to be useful and avoid attention to be diverted toward ineffective solutions. Third, search depth leads to a deeper understanding of knowledge, meaning that the company will be in a better position to exploit, combine, and improve it. However, innovation based only on search depth in most of the cases cannot last too long. At a certain point, further exploitation of old

knowledge implies too high costs and does not lead to performance improvements. Companies face diminishing returns to building on same knowledge. Moreover, it might drive organizations toward rigidity.

Similarly, also the search scope activity has pros and cons. Among the pros, Katila and Ahuja mention the creation of new knowledge pools and the discovery of possible combination between old and new knowledge. Among the cons, the major one consists in the costs of integration between different technologies and the reduction in reliability of innovative projects, since projects requiring too much new knowledge are less likely to succeed.

In Katila and Ahuja's opinion, despite the fact that both dimensions are characterized advantages and disadvantages, their interaction and proper balance can only bring benefits. The mechanism at the basis of this positive interaction is the absorptive capacity, which promotes assimilation and integration between different types of knowledge. The combination of search depth and search scope allows organizations to be unique and develop their own competitive advantage. Again, it is demonstrated that both exploitation and exploration are necessary, in the proper amount, to firms' success.

Other authors contributed to the study of exploitation and exploration. For instance, Benner and Tushman (2003) as well as He and Wong (2004) emphasize that both exploitation and exploration are activities of learning and innovation. He and Wong sustain that innovations derived from exploitation are directed at the improvement of existing products, while innovations derived from exploration bring to the creation of new products. Therefore, new knowledge acquisition is pursued by both activities, what changes is the technology trajectory: with exploitation the trajectory is the one already indicated by previous technology, with exploration it is a new one. On the opposite, other authors through time suggested that exploration is the only one requiring new knowledge and deep learning.

In our view, all activities involve a certain level of learning. Even when replicating routines, companies are accumulating experience and thus augmenting knowledge. As stated by Gupta et al. (2006) what distinguishes exploration and exploitation is not the presence or absence of learning, but the way and reason why it is accumulated.

2.2 Simultaneous Ambidexterity

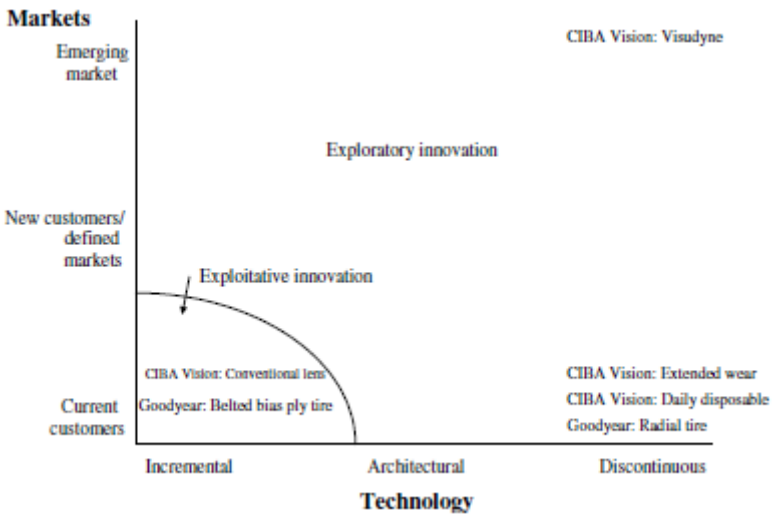
The first scholar to use the terminology 'ambidextrous organization' was Duncan (1976). In his study he affirms that successful organizations have a dual structure which adapts to company's need for exploitation or exploitation through time. As such, he marks the start of the sequential ambidexterity approach, which we will analyse later.

For what concerns simultaneous ambidexterity, O'Reilly and Tushman (2004) can be recognized as the first suggesting such a paradigm. In their opinion, companies should take care of past and current products and procedures and simultaneously look forward to changes and innovations. Consequently, they should exploit current capacities while exploring new opportunities. Finding the proper balance between the two activities is one of the major challenges enterprises have to face.

Three main innovation typologies have been identified that companies can pursue:

- Incremental: adjustments and improvements modest in size to past technology;
- Architectural: changes with respect to organizational design;
- Discontinuous: radical changes that modify the rules of the game in the affected market and make previous systems immediately obsolete. They can consist of technological shifts, sudden moves in competitors' behaviour or in consumers' one, radical progress in processes, macroeconomic changes.

Figure 10: Innovation typologies in relation to target markets and exploitation-exploration



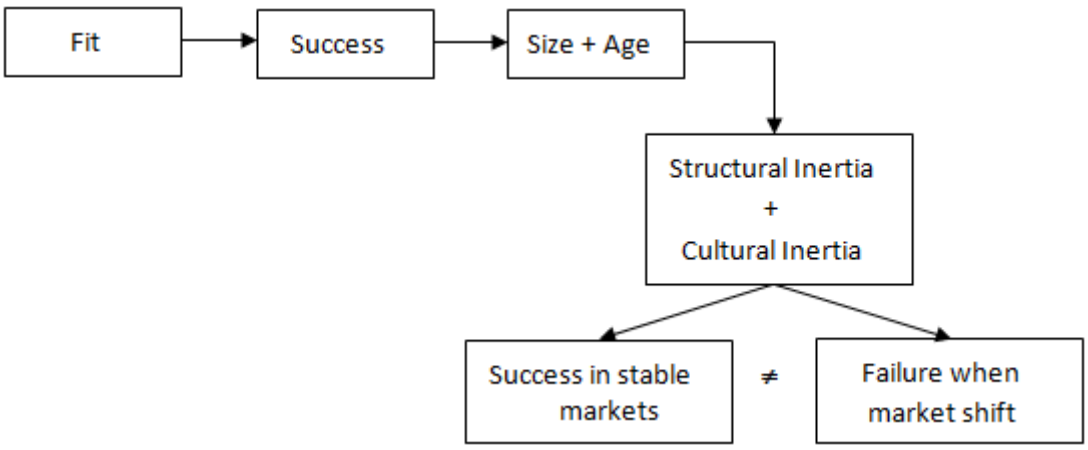
Source: Smith and Tushman (2005)

Some of these typologies of change have current customers as their target, others new market. As suggested by March (1991) incremental innovations build up on existing technologies and require exploitation, radical innovations need exploration and new knowledge. In addition, innovative activities realized by firms through time constitute the basis of their capabilities toward new innovative impetus since they contribute to the creation of knowledge and openness toward exogenous creative stimulus. Consequently, by pursuing both activities companies expand the tools at their disposal for prosperity.

Progress occurs though changes. When the competitive context is relatively stable and characterized by gradual alterations, evolution is radical. Anyhow, toady competitive environment is mostly characterized by continuous changes and companies have to be always ready to alter their structures and strategies to maintain the fit.

This is not easy. As stated by Tushman and O'Reilly (1996) when companies become successful, they usually develop specific structures and systems which can be really hard to modify both in terms of costs and time. In particular, they identify structural inertia as the resistance to change typical for complex and interdependent systems, and cultural inertia as the set of norms, rules, and values that are internalized by company's members. Generally, when a firm is in a market from many years, it means that at some point it has achieved success. The greatest the success is, the largest the size and the amount of procedures, norms, and values are. The greatest the systems' internalization is, the greatest the inertia.

Figure 11: The Paradox of Success



Source: Personal Elaboration of Tushman and O'Reilly (1996)

The paradox is clear. On the one side, companies have to increase the fit between strategy, structure, culture and company members, to ensure efficiency and operativity in the short term. On the other side, they must also be able to destroy such a congruent interplay between organizational features to remain responsive to change in business circumstances. In a long term perspective, firms are likely to find themselves in the need of dismantling current systems and building new ones. In order to do both, i.e. both pursue efficiency and remain reactive to changes, companies have to be provided with some internal mechanisms and they can do so through ambidexterity.

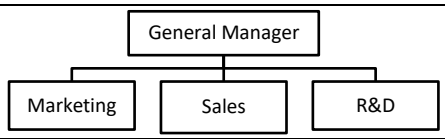
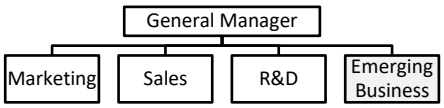
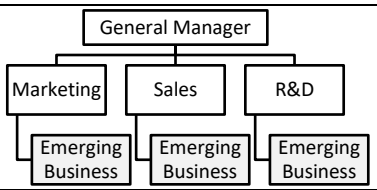
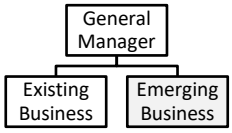
2.2.1 Simultaneous Structural Ambidexterity

O'Reilly and Tushman (2004) lay the basis for simultaneous structural ambidexterity. In investigating the reasons for some businesses' ongoing prosperity in the real world, they state that the key is in the ability to both exploit the present and explore the future. In particular, they found the structure for success, which separates units dedicated on exploration from those focused on exploitation, allowing for different systems, processes and cultures, at the same time keeping them tightly integrated at the top management level.

They clarify their point of view using as a metaphor the two-faced Roman god Janus who have a pair of eyes looking at the past and a pair of eyes looking at the future. Top managers should be able to look at the past and exploit previous and current organizational product, processes, competences and knowledge, and also look at the future and explore new solutions preparing the company to forthcoming opportunities. In such a sense they must find equilibrium and synergy between apparently irreconcilable units. Indeed, each unit is fully coherent in procedures, incentive systems, control systems, and culture in itself, but it is not when put in relation with other units. Managers then should lead strategic coherence at the organizational level and guide the amount and type of innovative and exploitative activities. In order to do so, the top management team has to develop a cognitive model that allows it to look for both activities.

Tushman and O'Reilly (2004) describe four main modalities that companies can deploy in conducting exploitation and exploration: functional design, independent team, cross-functional team, and ambidextrous organization.

Table 3: Structures for simultaneously pursuing exploitation and exploration

	Schema	*Brief definition*
Functional design		Projects are integrated into the existing organizational and managerial structure.
Unsupported team		Projects are set up outside the established organization and management hierarchy.
Cross-functional team		Projects operate within the established organization but outside the existing management hierarchy.
Ambidextrous organization		Project teams are structurally independent units, each having its own processes, structures, and cultures, but integrated into existing management hierarchy.

Source: Personal elaboration of O'Reilly and Tushman (2004)

In authors' opinion, the last organizational typology is the one that is better able to achieve innovation while allowing for efficient exploitation. In this configuration project teams for the emerging business have different processes, structures, cultures as compared to those for the existing business. General managers' task is that of granting integration between businesses. Cooperation makes possible for different units to use some resources, such as knowledge, expertise, talents, of one another allowing for the spread of ideas and problem-solving possibilities. At the same time, the structural separation let units the proper freedom and reduce the risk of inertia.

In requiring one single organization to perform exploitation as well as exploration, conflicts and frictions between existing products and innovations cannot be avoided. Proper strategic decision making asks managers to understand and use these conflicts, rather than trying to solve them. Borrowing from the literature on paradoxes and contradictions, Smith and Tushman (2005) propose a model for handling strategic conflicts: top manages and senior leaders articulate a paradoxical frame, they make a

distinction between architecture and strategy adopted for existing products and those for innovation, and they integrate these strategies and architectures. In order to do so, they have to apply paradoxical cognitive frames and paradoxical cognitive processes.

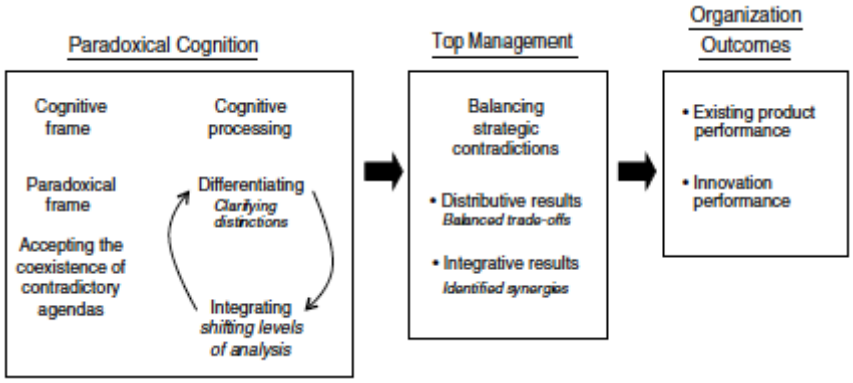
Cognitive frames are stable constructs that help people in understanding the surrounding context and in putting together behavioural responses. Paradoxical frames are mental templates in which the simultaneous coexistence of contradictory and conflicting forces is accepted. Paradoxical frames can improve organizational performance for two main reasons. First, they guide managers toward the formulation of distinct goals for the exploitation of existing products and for the exploration of new ones. In this way, exploitative and explorative units feel regarded and motivated at the same level. Second, paradoxical frames make evident that managers expect units in both activities to succeed. This mitigates unproductive competition between units and foster cooperation, instead, for the benefit of the firm as a whole.

Cognitive processes consist of complex behavioural routines that allow managers to internalize and understand information. Cognitive frames lay at the foundation of cognitive processes, as such paradoxical frames constitute the basis for cognitive processes able to deal with inconsistencies. This involves two main mechanisms: differentiation and integration. In Smith and Tushman's opinion, differentiating helps the organization in limiting inertia by avoiding innovative units to be lock in current strategies and by simultaneously keeping clear the importance of existing products. On the opposite, integrating emphasizes synergies among the two activities and encourages people to see how they might actually promote one another. Note that just differentiation may lead to competition within the company, as suggested before, and this is where integration plays an even more important role. Integrative thinking builds on conflicts to find out synergetic solutions at the company level. Along these lines, it is important to outline that differentiation and integration are not opposite but complementary processes. Shifting the focus from units to the whole organization reinforces cooperation between contradictory agendas and enable managers to make better trade-offs.

In sum, ambidextrous organizations consist of very different units which must be integrated by the top management team. It has to decide the culture, the organizational

structure and the resources that have to be allocated to each unit in order to achieve at the same time exploitation and exploration. Top managers must give a sense to an organizational contest made of contradictions and find benefits in opposite views.

Figure 12: A model of Managing Strategic Contradiction



Source: Smith and Tushman (2005)

To conclude, we report the variables that characterize exploitation units and exploration units. The schema, proposed by O'Reilly and Tushman (2004) emphasizes again how ambidextrous organizations have competences and structures which appear to be internally incoherent but which are in reality following a single view promoted by the senior management team. By celebrating stability and incrementalism, and experimentation and discontinuous change, they can keep efficiency and entrepreneurial stimulus altogether and accumulate and use the maximum knowledge possible. In this way, ambidextrous organizations can remain successful in today environment, with Teece (2007) words, by pursuing sensing, seizing, and reconfiguring capabilities.

Table 4: Alignment in Ambidextrous Organizations

Alignment of:	*Exploitative Units*	*Exploratory Units*
Strategic intent	Cost, Profits	Innovation, Growth
Critical tasks	Operations, Efficiency, Incremental innovations	New products, Discontinuous innovation
Competences	Operations	Entrepreneurial
Structure	Formal, Mechanistic	Adaptive, Loose
Control and Reward	Margins, Productivity	Milestone, Growth
Culture	Efficiency, Low risk, Quality, Customers	Risk taking, Flexibility, Experimentation
Leadership role	Authoritative, Top down	Visionary, Involved

Source: Personal elaboration of O'Reilly and Tushman (2004)

2.2.1.1 Some Variances to Simultaneous Structural Ambidexterity

Some organizations use approaches that are alternative to the ambidextrous structural model just described but that equally seek to achieve ambidexterity through specific business architectures. These approaches are switching structures, separate creative units, venture teams, and internal organizational entrepreneurship (Daft, 2010).

Companies that apply the switching structure model are characterized by an organic structure, consisting for instance of heterogeneous teams, during the creative and exploration phases, and then by a mechanic structure for the operative and exploitation phase. For instance, firms could use teams made up by people from different units for activities such as brainstorming and problem solving for longer or shorter period with respect to the issue in consideration, and then move to a mechanic organizational architecture in order to realize and exploit what discovered.

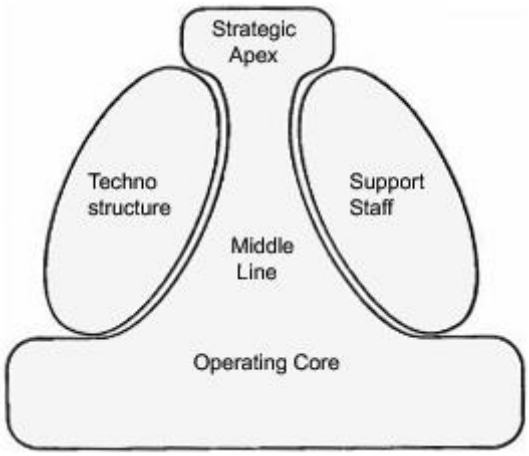
Other companies may rely entirely on separate creative units set up specifically for the recognition of new opportunities and the switching-on of the innovative process. Those units apply an organic structure, innovative projects believed to be successful are carried on by the other units with a mechanic structure.

Venture teams are also teams specifically set up with the objective of innovation. These teams are usually composed by a limited number of employees and are located outside the normal business and company's architecture to minimize influences o the exploring and research activity.

In addition, the adhocratic model must be mentioned since it is one of the main precursors of the ambidexterity concept and an important perspective nowadays too. Adhocracy was born in opposition to bureaucracy as an adaptable and informal organization structure. It consists in an organic architecture in which experts with different backgrounds are grouped together to pursue ad hoc innovation activities. Transversal competences are paramount for all individuals who have to solve complex issues, which are not only complicated per se but also involve interlocking and interacting sub-problems. It is thought to be applied in dynamic environments requiring structure flexible enough to adapt to changes. Mintzberg (1980) considers adhocracy the model of the future in contrapositions to the other four models he describes (simple structure, machine bureaucracy, professional bureaucracy, divisionalised structure).

More generally, Mintzberg (1980) believes organizations to be constituted by five parts: the strategic apex, the middle line, the operating core, the technostructure, and the support staff.

Figure 13: The basic parts of the organization



Source: Mintzberg (1980)

The strategic apex can include the entrepreneur, the top managers and senior executives who define and provide an interpretation of company's mission and ensure strategy implementation and the achievement of firms' objectives. In this sense, they constitute the link between the firm and the macroenvironment.

The middle line connects the apex to the operating core. Line managers interpret the objectives provided by the top leaders, manage the units they head, and periodically give feedbacks to the apex.

The operating core consists of all those individuals and activities necessary to deliver the desired output.

The technostructure is made up by all those analysts and experts being part of a wide range of functions – such as human resources, training, finance, planning – that defines procedures, mechanisms, and tools that should be used by the operating core. Finally, the support staff, which again comprehends various functions – for instance, public relations, research and development, and legal services, finds its principal aim in assisting core activities. In this sense, it is critical to the effectiveness and efficiency of the strategic apex, the middle line and the operating core, even if not directly contributing to the core business activities.

The way in which these elements interact have a direct impact on the nature of the organization. For instance, in a bureaucratic structure the strategic apex is likely to coordinate itself with the other parts through supervision. Moreover, Mintzberg (1980) affirms that each part tends to prefer a specific coordinating method – for example, the technostructure prefers to standardize activities' processes and similarly the middle line attemps to standardise output.

The adhocratic structure is defined by an organic structure, small units, very low levels of formalization and high levels of decentralization. Technostructure is not well-developed, while on the opposite, the support staff is advanced and well-established, even if the role of both slightly differs from the one of the intermediate line. The strategic apex seeks to ensure a stimulating and imaginative environment, assuming that innovation cannot spring within fixed and stable structures and models. Along these lines, no one within the organization has the monopoly over innovation, often individuals are allowed to move from function to function and between different units as they wish, in order to favour the sharing of different insights and the generation unconventional ideas. Coordination is achieved through the individuals' common effort toward innovation, which autonomously guides to mutual adjustment. The most relevant linking mechanisms are groups, direct contact, face-to-face, informal and spontaneous forms of interaction.

Adhocratic firms base their competitive advantage on the ability to rapidly reconfigure internal knowledge and competences with external stimuli and consequently create innovation and even new market segments. Dynamicity and learning are among its pillars. However, the great amount of this expertise and innovative potentialities are embedded in individuals themselves. Consequently, turnover constitutes a great risk for adhocratic firms. It is suggested that they must be inserted in a wider range of skilful and knowledgeable companies.

2.2.2 Simultaneous Contextual Ambidexterity

Since the first studies, scholars have increasingly recognized the importance for companies to simultaneously undertake and balance apparently opposite forces and, in doing this, have shifted their attention from either/or trade-offs to both/and paradoxical thinking. Moreover, this brought to a new set of literature focusing on the importance of

organizational context in order to reach balance between contradictory tensions, which provides an alternative route toward ambidexterity against that of specific architectures and structures.

Birkinshaw and Gibson (2004) define contextual ambidexterity as "the behavioural capacity to simultaneously demonstrate alignment and adaptability across an entire business unit". They also specify that alignment has to be intended as the coherence among all patterns of activities within the business unit, while adaptability indicates the capacity of reconfiguring business unit's activities rapidly to meet the changing demands of the environment. Indeed, recent economic uncertainty and fast pace in technological movements have made evident to every company the necessity of a certain level of adaptability skills, which reflect the firms' capacity of grasping new opportunities, avoiding complacency and inertia, and successfully facing markets' turbulences. Nonetheless, flourishing companies should also have excellent capacities in exploiting their main assets and maximize efficiency. In such a sense, we can assimilate the concept of 'alignment' to the one of exploitation and the concept of 'adaptability' to the one of exploration.

During three years Birkinshaw and Gibson collected data from 41 business units in 10 multinational companies and found that through time a structural approach toward ambidexterity may lead to the isolation of business units. Members of explorative business units may have brilliant ideas which however end up not to be accepted because of the lack of connection with the core business, similarly exploitative units may find hard to adapt to innovations when they come to be pursued. Moreover, many companies decided to adopt some approaches alternative to the one of pure structural ambidexterity, as those we mentioned previously. From this starting point authors propose their configuration for contextual ambidexterity.

The model of contextual ambidexterity shows strong differences with structural ambidexterity and sequential ambidexterity because contextual ambidexterity is not built on dual structures and cultures nor on the temporal alternation of different activities, contrarily it is based on a series of processes and systems and a unique soft organizational culture that enable and encourage individuals to use their own judgement and make their own decision about how to allocate their time and efforts between

conflicting requests for alignment and adaptability. In other words, in authors' opinion superior performance is not to be obtained primarily through formal structures, nor through a charismatic leadership, nor even through strong culture. It is obtained by properly shaping carefully selected systems and processes that altogether determine a context which facilitates the creation and prosperity of both alignment and adaptability at individual level, all coupled with leaders' support. Thus, contextual ambidexterity pervades all functions and levels in each unit. It is a behavioural oriented approach.

Table 5: Comparison between Structural and Contextual Ambidexterity

	Structural Ambidexterity	*Contextual Ambidexterity*
How ambidexterity is achieved	Through separate business units which focus on exploitation or on exploration	Within each business units both exploitation and exploration can be pursued
Who decides about the split between exploitation and exploration	Top management team	Each organizational member
Role of top management	To define structures and balance exploitation and exploration	To develop the organizational context in which individuals act
Nature of roles	Relatively clearly defined	Relatively flexible
Skills of employees	More specialists	More generalists

Source: Personal Elaboration of Birkinshaw and Gibson (2004)

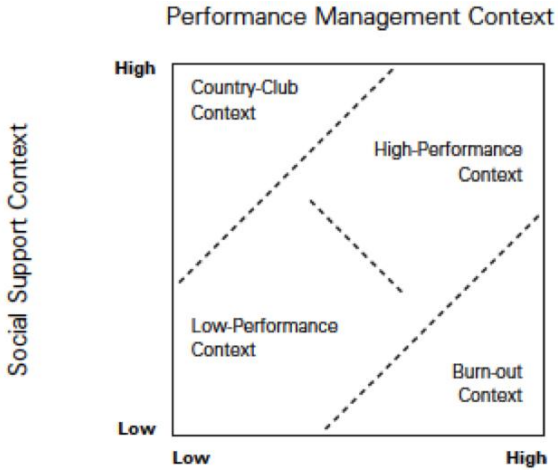
From Birkinshaw and Gibson research four main characteristics emerge that should belong to ambidextrous individuals. First, ambidextrous individuals are proactive and alert toward opportunities beyond their current scope. Second, they collaborate with the other organizational members and seek for solutions useful to the whole business. Third, they are networking people. Fourth, they are able to accomplish more tasks simultaneously. Then, all this gets translated from the individual level to the organizational level. In fact, the contextual ambidextrous approach at the organizational level implies collective agreement and effort toward simultaneous pursuit of alignment and adaptability. Authors clarify that said context can be achieved in different ways and at different speed by each company, but it always guides individuals toward common sense of initiative, cooperation and strive toward exploitation and exploration.

Following a previous study by Goshal and Barlett (1994), Birkinshaw and Gibson propose four main behaviour-framing attributes determining the organizational context:

- ❖ Discipline causes individuals to voluntary seek to successfully achieve the expectations derived by their explicit or implicit commitments. It is established through clear performance and behaviour standards, mechanisms for rapid and consistent feedbacks, fair application of rewards and punishments.
- ❖ Stretch causes individuals to look for more, rather than less, ambitious goals. It is established by linking individual contributions to organizational objectives with personal meaning, by developing a collective identity and shared ambition.
- ❖ Support causes individuals to cooperate and help one another. It induces organizational members to give guidance and support rather than to exercise authority, and allows the creation of a truly common pool of resources.
- ❖ Trust causes individuals to rely on each other commitments. It is established through fair staffing mechanisms, so that people with proper capacities get roles and positions accordingly, and through involvement in decisions of those affected.

By the interaction of these factors we obtain four possible organizational contexts.

Figure 14: Four Organizational Contexts



Source: Birkinshaw and Gibson (2004)

The Burnout context is characterized by a strong orientation toward returns and low social support. In such a context ambidexterity is difficult to be achieved since organizational members' performance is likely to be individualistic and authority-driven, even if high. Therefore it eliminates cooperation and personal judgment. The Country Club context is given by a low orientation toward performance and a high social support. In this case individuals benefit from the sense of community that

pervades the company but rarely express their full potential. As such, firms still have good results but not as good as they could be.

The Low Performance context is determined by low performance orientation and low social support and it is likely to fail both at alignment and adaptability. The High-Performance context is characterized by a high level of both performance orientation and social support and it is the one to be shaped in order to achieve ambidexterity. Indeed, when a supportive organizational context is created where individuals cooperate and are encouraged toward results, they engage in both exploitation activities and exploration activities and subsequently boost performance.

Through the right context, people in the organization develop ambidextrous traits, also those down in the hierarchy. Top managers indeed should foster internal entrepreneurship, which aims at developing entrepreneurship within the organization itself to produce a number of innovations above the average (Daft, 2010). It implies the deployment of venture teams and other creative groups of people able then to spread the innovative energy in all the organization. Many times some champions are recognized who are able to break routines and overcome inertia. They should not only develop their innovative idea but also promote their own vision throughout the firm. To facilitate such a cultural approach, each organizational member should be involved in alignment and adaptability so that everyone will have the capacities to understand a new idea and exploit it. It is to be understood that all individuals within a company have some talents to share, and, more than that, given the current economical environment, also more operative members should develop cross-functional and transversal skills, and be provided with a full picture of company's business. Everyone in the firm should have personal and collective improvement as an objective and be involved in tasks and roles promoting their own motivation and engagement. In other words, in this view leadership capabilities should belong to all organizational members.

2.2.3 Simultaneous Leadership-based Ambidexterity

As we saw, researchers that have dedicated part or all of their work to ambidexterity have conceptualized it as a matter of structures (O'Reilly and Tushman, 2004; Smith and Tushman, 2005) or of behavioural contexts (Gibson and Birkinshaw, 2004). However, the majority of studies on the topic, despite having favoured the structural or

the contextual approach, have emphasized the importance of proper leadership. As company's leaders, indeed, top managers have a crucial role in promoting organizational ambidexterity. For instance, Gibson and Birkinshaw (2004) affirmed that top managers have the task of shaping the organizational context, Smith and Tushman (2005) outlined the integrative character of the top management team, and, before than them, Tushman and O'Reilly (1997) stated the top management team's "internal processes that enable them to handle large amounts of information and decision alternatives and deal with conflict and ambiguity" are what can actually guide the accomplishment of ambidexterity (1997).

Recently, some authors suggested that leadership mechanisms for ambidexterity could be considered independently from organizations' structures and contexts. In such a sense, leadership constitutes a separate approach to ambidexterity.

Among the first to suggest such a view, we can mention Lubatkin, Simsek, Ling, and Veiga (2006). In their study, top management team processes are considered a specific typology of group processes since TMT members face higher level of responsibility individually and interdependently as a team. They focus on behavioural integration into the TMT team of SMEs. Behavioural integration refers to the extent to which groups engage in collective and mutual interaction, impacting the information sharing, collaboration level and joint decision making. Lubatkin et al. (2006) suggest that companies having highly behaviourally integrated TMT teams are dramatically more likely to be successful in jointly pursuing exploitation and exploration since TMT members are more likely to effectively deal with and combine contradictory knowledge. In sum, they affirm that behavioural integration promotes cooperation and information exchange within the TMT by fostering social mechanisms such as reciprocity and trust. Consequently, they found that behavioural integration is positively correlated with firms' ability to respond and adapt to changes in the environment by increasing the level of know-how and tacit knowledge sharing between top managers so that existing and novel marketing and technological trajectories are better sensed and seized.

In taking a more practical approach, Jansen, Tempelaar, Van den Bosch, and Volberda (2009) first affirm that organizational ambidexterity is a dynamic capability by its nature, since it implies routines and processes for mobilizing, coordinating, and integrating resources toward opposite directions, and then continue by analysing two

main TMT integration mechanisms that can be applied to facilitate managers' tasks of pursuing exploration and exploitation simultaneously: contingency rewards and social integration. Tensions within the company are reflected on the senior manager team, and the need of both alignment and innovation is likely to exacerbate conflicts. Resolving these tensions in TMT is critical to successful strategies. The mechanism of contingency rewards links individual benefits to team outcomes, so that outcome interdependency is established and senior managers are forced to put more attention on interdependent rather than individual activities. Along this line, this system might be very helpful for ambidextrous organizations which have to ensure contradictory commitments and consequent mutual adjustments. While senior team social integration, with a reference to the already mentioned behavioural integration, implies interaction and common satisfaction within group members. In such a sense, socially integrated senior managers will leverage their different capabilities and knowledge in exploitation and exploration more and better than other teams. Consequently, sensing and seizing opportunities will be easier for them as well as balance conflicting agendas. TMT's social integration mediates the relationship between exploitation and exploration units stimulating debates at the senior team level and recombination of knowledge. The authors sustain this second approach is the best one.

Throughout the first chapter, we demonstrated the importance of knowledge sharing and acquisition for achieving dynamic capabilities and consequently ambidexterity. Indeed, knowledge management is paramount for the pursuit of both exploitation and exploration. Mom, Van Den Bosch and Volderba (2007) suggest a shift in perspective by moving the analysis from organizational level and business unit level to the managerial level, especially due to the role that managers play in managing knowledge. The authors affirm that managers can facilitate exploitation and exploration by encouraging top-down and bottom-up knowledge flows. In particular, top-down knowledge flows are useful for exploitative activities while bottom-up flows for explorative ones. If managers support too much top-down information exchanges, exploitation is likely to increase against exploration, while with too much emphasis on bottom-up knowledge sharing the opposite is true. It can be deduced from what just said that the greatest the cognitive flow is in both directions, the greatest the levels of both exploration and exploitations can be achieved by managers.

In addition to managing cognitive flows, O'Reilly and Tushman (2011) affirm that in an ambidextrous organization managers have to undertake two extremely important tasks: on the one side, they have to sense changes in environmental circumstances, such as political, economical, and technological changes, and on the other side they have to quantify the extent of the changes and consequently reconfigure organization's tangible and intangible assets and business, in other words to seize opportunities. Ambidexterity is an organizational dynamic capability that facilitates firms in the adaptation process and in running efficiently and effectively the business. For this to occur, it is necessary for senior management to know how to deal with exploration and exploitation. The development of this organizational dynamic capability is among senior management's duties and O'Reilly and Tushman (2008, 2011) suggest five features that they consider critical to that.

1 Feature: A compelling strategic intent that clarifies the importance of pursuing both exploitation and exploration;

2 Feature: Clear articulation of common values and vision to build a common identity across exploitative and explorative units;

3 Feature: A top management team owning both exploitative and explorative units' strategy, shaping a common-fate reward system, and continuously communicating strategy;

4 Feature: Separate but aligned organizational architectures (business models, structures, incentives, culture) for exploitative and explorative units, integration at both senior and tactical levels aiming at leveraging organizational assets in the most appropriate way;

5 Feature: A leadership able to tolerate and resolve conflicts and tensions coming from separate alignments.

Even if in some features this model reminds structural ambidexterity, the main emphasis is always given to the role played by management. In authors' opinion, these features will allow management to leverage organization's assets in a way that allows firms to adapt to arising opportunities and threats, to reconfigure current competencies and assets in order to explore new opportunities while the company continues to compete efficiently in current markets. The first two features (strategy articulation and common vision) are about strategy formulation and constitute the "easy part" of TMT's task. The

other three features are about strategy implementation and this is where the tough part lies. Execution asks for hard choices about leaders' behaviour, resource allocation, integration and asset leveraging. Consequently, ambidexterity can be seen as a complex senior leadership task requiring an integrated set of structural, strategic, incentive, and top team process decisions.

In order to fully understand the positive impacts that these features have on the pursuit of ambidexterity, it is useful to imagine a situation where a company is not equipped with them. Without a strategic objective properly involving all organizational members around the ambidextrous perspective, companies are likely to be unwilling to give up some of their resources on exploitation, which gives evident and immediate positive result, at the advantage of exploration. Similarly, without common vision and values, cooperation and asset leveraging become hard to promote. Senior management teams with no consent on ambidexterity are not able to solve contradictions and some team members are also likely to resist to innovation and undermine integration. Decisional processes are likely to slow down and involve conflicts.

O'Reilly and Tushman (2011) tests their hypotheses through structural interviews conducted with senior managers in fifteen different companies trying to accomplish an ambidextrous business model. They found out that most successful ambidextrous firms have leaders who developed a clear organizational vision and common identity (feature 2), senior team is fully committed to both exploiting and exploring (feature 3), employ distinct but coordinated exploitative and explorative subunits (feature 4), and can deal with contradictory forces and requirements in allocating resources (feature 5). The clear articulation of strategy (feature 1) and, to a lesser extent, the delivery of a common vision (feature 2) did not strongly discriminate between more and less successful ambidextrous firms. This plainly suggests that intellectually explaining why ambidexterity is important does not directly lead to its implementation.

To conclude, these results largely confirm observations by Teece (2007) who sustains that dynamic capabilities largely lie within the ability of the top management team. Concretely, O'Reilly and Tushman studies suggest that ambidexterity as a dynamic capability rests on the ability of senior leaders not only to articulate strategic intent but also and more critically to their ability to handle tensions inherent to business model.

2.3 Sequential Ambidexterity

As suggested at the beginning of the chapter, simultaneous ambidexterity whether structural, contextual, or leadership-based, is not the only way in which companies solved the exploitation-exploration paradox. Sequential ambidexterity, which we recognize in the punctuated equilibrium approach (Romanelli and Tushman, 1994), can be considered an alternative mechanism. Sequential ambidexterity implies the periodical interchange between long phases of exploitation and short phases of exploration. Building on Eisenhardt and Martin (2000) and Zollo and Winter (2002) sequential ambidexterity can be defined as time-paced sequence of exploration and exploitation. Indeed, as we saw, Zollo and Winter (2002) described dynamic capability as a system of routines developed through creative variation, i.e. exploration, and replication, i.e. exploitation. They further suggest that exploitation can precede exploration and then follow one another through a recursive co-evolution. This form of dynamic capability directly links to the mentioned punctuated equilibrium (Tushman and Romanelli, 1994; Burgelman, 2000; Gupta et al., 2006) and it is also coherent with Smith and Tushman (2005)'s discussion over conflicts connatural in managing strategic contradictions. In fact, the temporal switch in activities and organizational members' focus seems to be a rational answer to the paradox in examine. The equilibrium is achieved at different times rather than at the same time.

Romanelli and Tushman (1994), the first scholars to define the punctuated equilibrium model and to test part of its features, describe the companies applying such a model as "evolving through relatively long period of stability (equilibrium periods) in their basic patterns of activities that are punctuated by relatively short bursts of fundamental change (revolutionary periods)." They also add that periods of revolution substantially "disrupt established activity patterns and install the basis for new equilibrium periods". These authors sustains that initially organizations develop a series of activities – those most in line with current environment – and stabilize their business within these patterns. As a consequent, companies find themselves in equilibrium. Through time, systems are built within the organization that promote and further establish achieved equilibrium. As a result, inertia and institutionalization spread and companies develop routines and procedures that support a shared business vision and the continuation of set

up patterns. Changes can only occur through shifts enough radical and revolutionary to break inertia and have an impact on organizational strategy and structure. Innovation processes are disruptive. In fact, resistance to change is a crucial concept in the punctuated equilibrium model in that it lays down the principal condition that backs up revolutionary transformations as the main means to achieve organizational changes. According to this view, interdependence between organization subunits is an organizational characteristic that cannot be underplayed, in contrast with the substantive independence of units in models for simultaneous ambidexterity. Enterprises are defined through aligned and complementary structural variables, through common institutionalized patterns of culture and norms, and by a network of interdependent relationships between individuals internal and external to the firm. As such, interdependency fosters resistance.

How is then possible to stimulate organizational transformation? Relevant changes in firm's environment, severe crisis in the performance of the organization, radical actions taken by chief executive officers have been proposed as the main forces that may lead to the break of organizational patterns and the overcoming of inertia. In other words, changes at the organizational level occur whenever it is recorded a significant change in the context, firms' outcome, and power distribution domains in the enterprise. It must not be forgotten that radical transformations entail a higher failure risk since they typically destroy some or all the business features that the company carried on to that moment without any guarantee of success (Romanelli and Tushman, 1985). Nevertheless, exploration is mandatory to company survival.

Later on, studies in strategy management have been pursued for what concerns the implementation of sequential ambidexterity. One of the most famous among them is the longitudinal study by Burgelman (2002), who took into analysis the strategic decisions by Andy Groove, Intel's CEO, during a period of ten years. The study springs from the question whether induced, i.e. guided by the current business and typically exploitative, strategy processes as opposed to spontaneous, i.e. creative and innovative, strategy processes are necessarily at odds with one another or can effectively coexist. Is optimal long-term adaptation guided by sequential or simultaneous ambidexterity? Further, Burgelman poses attention on the phenomenon of co-evolutionary lock in, which is described as the positive feedback process that leads companies to tie their success to

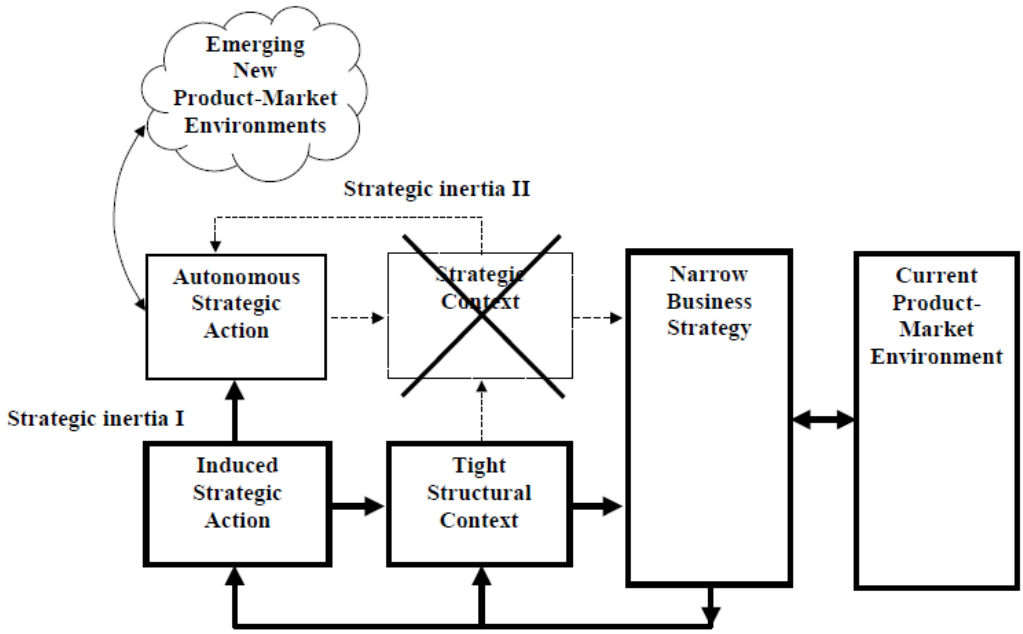
their current strategy and current environmental circumstances, making it more and more difficult to alter strategic decisions. In author's opinion, the inertial consequences of co-evolutionary lock-in are directly associated to the paradoxes of balancing exploitation and exploration processes in organizational learning, and induced and autonomous processes in strategy making.

As the CEO of Intel, Groove decided to focus on the microprocessor business, taking less care of the development and maintenance of the innovative capacities of the company. Indeed, exploitation activities and exploration activities were competing for company's scarce resources and the trade-off was inevitable. Given the great returns that Intel's core business were providing during the late '80s, Andy Groove preferred to divert all firm's effort toward those activities and toward learning mechanisms designed to boost well-established performance patterns rather than toward knowledge variety, and used his charisma to create a common corporate strategy to the detriment of personal strategic initiatives. In other words, he rapidly guided all organizational members' beliefs toward a common code (facilitated by the fast speed of socialization for what concerns turnovers and new hirers), and this common code tremendously emphasized exploitation.

In 1997, Intel's Chief Operating Officer Craig Barret observed that the company's core business started to resemble a 'creosote bush', a desert plant that poisons the surrounding ground making it impossible for other plants to grow in its vicinity. This analogy stands for exemplifying the extreme negative consequence of too high reliance on induced strategy and the effects of co-evolutionary lock-in. As explained by Burgelman (2002), induced strategy expands itself within the boundaries of firm's current product-market environment and, therefore, exploits only those initiatives that are within the scope of firm's current strategy. On the opposite autonomous strategy exploits those initiatives that emerge thanks to explorations outside the scope of firm's current strategy and, as such, provides insights over opportunities for entering into new product-market environments. During Grove's leadership, induced memory-related and autonomous innovation-related initiatives compete rather than complement one another, more than that, Grove began to think at non-core novel businesses as a distraction. The focus on current business and exploitation were gone so far that was impossible within

the company to develop something new. Craig Barret's observation necessarily raised many questions among Intel's top managers and about the strategic path to follow.

Figure 15: Effect of an Induced Strategy Vector on Strategy making



Source: Burgelman (2002)

The figure above illustrates the paradox of adaptation Intel, and each company, face in its development and the effects of co-evolutionary lock-in. A company's successful pursuit of a narrow business strategy through induced strategy and tight structural context may obstacle autonomous strategy development consequently reducing company's capacities of long-term adaptation. The study by Burgelman (2002) raises the question whether autonomous and induces strategy processes are substantively at their odds or could be pursued together, without giving a definitive answer. Indeed, maintaining a balance between induced (exploitative) and autonomous (exploratory) strategy processes as well as between exploitation- and exploration-focused organizational learning efforts involves similar difficulties both pursuing them at the same time or sequentially. Author seems even to suggest a sort of synergy between sequential and simultaneous ambidexterity in that he recognizes that to obtain effective alternation of exploitation and exploration periods some of both are necessary also at the same time. Moreover, he emphasizes how the Grove's efforts to vectorize all the

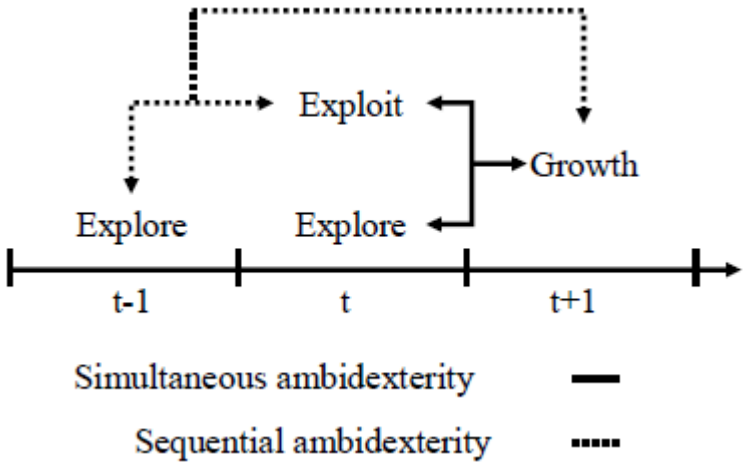
organization in the same view did not prevented autonomous initiatives to emerge, it just prevented those initiatives from being recognized and exploited at the company level. The strategic context determination process thus appears to be crucial for the linkage between exploration and exploration and the balance between these conflicting initiatives. The capacity to activate and successfully accomplish such processes is at the heart of sequential ambidexterity.

The study by Venkatraman, Lee and Iyer (2007) contributed to the sequential ambidexterity approach by supporting the model from an empirical point of view. In a sample of 1005 software firms, they tested the impact of ambidextrous strategies on firms' performance over a twelve-year period. Furthermore, they incorporated time into their model so that it was possible to distinguish between companies applying simultaneous and sequential ambidexterity. Authors get back to Eisenhardt and Martin (2000), Winter (2003) and Teece (2007)'s researches and define ambidexterity as a dynamic capability that allow companies to build, integrate and reconfigure internal and external competences in order to quickly follow market's movements. Along these lines, they describe ambidexterity as an organizational-level capability that consists of a series of routines, and distinguish between simultaneous ambidexterity conceived as a set of routines aiming at the simultaneous pursuit of exploitation and exploration, and sequential ambidexterity understood as the temporal alternation of routines for exploitation and routines for exploration. The critical requirements that companies are making to routines is to efficiently convert inputs into outputs in the short term while adjusting and renewing routines to overcome rigidities.

In the same way He and Wong (2004) empirically studied the effects of a simultaneous ambidextrous organization over the sales' growth rate, so Venkatram et al. (2007) tested the positive relation between sales and sequential ambidexterity. Their model takes into account the time at which the activities of exploration and exploitation take place. Exploitation was measured by determining the amount of product-market combinations in firms that remain unchanged in years t and t-1, then the level of sales was computed after having weighted similarities between all pairs of firms' common markets. For what concerns exploration, it was measured by determining product-market combinations supported by firms in year t but not in year t-1, then scholars computed the level of sales having weighted the dissimilarities between firms' new and old

markets. As such, companies disclose two types of orientation with respect to their business: one toward the present and one toward the future. By making this distinction, authors were able to expand the practical and theoretical insights over the mechanisms firms choose to balance the conflicts and allocate its scarce resources among these opposite forces.

Figure 16: Schema of Simultaneous and Sequential Ambidexterity



Source: Venkatram et al. (2007)

In the case of sequential ambidexterity, exploration occurs at time t - 1, while exploitation at time t. Then, the accomplishment of both these activities leads to an increase in sales at time t + 1. Success thus is guaranteed by the effective alternation of these two activities. The study by Venkatram, Lee and Iyer (2007) established that in their sample the sequential pursuit of exploration and exploitation leads to superior effects on firm performance as compared to concurrent attempts to solve this trade-off.

2.4 Main Tensions within the Ambidexterity Approach

After this overview about the different perspectives through which it is possible to address the ambidextrous organization model, it is worth to describe the principal tensions that arise in such model through the various authors we just mentioned.
We take as a reference the study by Raisch, Birkinshaw, Probst, and Tushman (2009) which lists four main tensions.

Firstly, authors name the evident contradiction between differentiation and integration as ways for achieving ambidexterity and question whether these two methods can be

considered two alternative or two complementary routes. Indeed, most researches posit them as mutually exclusive, even if more recent studies suggest that, depending on the company's characteristics, both are likely to be necessary. With the term differentiation we intend the spatial separation between units for exploitation and units for exploration. While with integration we refer to the mechanisms that allow companies to simultaneously pursue exploration and exploitation within the same unit.

Secondly, there is no homogeneity with respect to the proper level of analysis to be used for ambidexterity. Some authors believe ambidexterity could be achieved with an organization-wide solution, and indeed most studies seek to find structures and systems that will lead the firm as a whole to being ambidextrous, others prefer to focus on individuals and their personal abilities to both explore and exploit. Furthermore, others outline how some mechanisms and procedures promoted at the organizational level might facilitate people in developing and applying ambidextrous capabilities on individual basis.

Thirdly, authors outline that the ambidextrous organization model has been conceived both statically and dynamically. Structural ambidexterity seems to suggest a static solution: organizations can become ambidextrous by applying a certain configuration. However, today it is clear that static models are not the right answer to the demanding and dynamic environment companies have to face. Contextual ambidexterity leaves to individual organizational members the task to decide whether to focus more on exploitation or exploration depending on the specific opportunities and circumstances. Differently, leadership-based ambidexterity believes the leader is the one who has to take the trade-off decision and lead the others. Sequential ambidexterity tries to alternate static phases to dynamic phases.

Fourthly, the last tension springs from a deeper analysis of the possibility for achieving ambidexterity not only within the company but also between companies. So far it is possible to obtain a wider range of studies analysing how ambidexterity can be reached internally to single firms. However, one critical issue has always been also the necessity to gain knowledge externally and grab innovation from every source. Consequently, correlation between internal and external mechanism is relevant in the pursuit of

ambidexterity. Some researchers even suggest that it could be possible to create a net of firms with different focus and that in their totality reach ambidexterity.

Now we are going into much deeper analysis of each of the four said dichotomies, simultaneously providing a summary of all the studies mentioned throughout the chapter. Indeed, the majority of them has supported one or the other side of each tension and, as such, allow us to appreciate the full spectrum of scholars' perspective available.

2.4.1 Differentiation versus Integration

In last decades researchers have outlined that synergy and harmony be sought between differentiation and integration in order to gain the most from these two mechanisms. However, frequently scholars ended up by focusing only on one or the other aspect.

The first strand of work affirms that differentiation, as division of exploitative and explorative tasks between separate units and consequent differentiation of working contexts, is the key to ambidexterity. Following the guidelines of this approach, typically the units dedicated to exploration are smaller and characterized by a decentralized and flexible structure. On the opposite, exploitative units rely on clear and hierarchical definition of roles and position, bigger size, and cost reduction mechanisms. Further, this divergence in duties is emphasized by spatial separation between units, which can go as far as locating units, as well as teams and tasks forces, for exploration outside the firm carrying on the usual business (Tushman and O' Reilly, 1996; O' Reilly and Tushman, 2004).

Critics of this view outline how activities of exploitation and exploration shall be recombined to create value for the company and this might result to be particularly harsh when activities are separated at an extreme extent. Along these lines, they believe that coexistence of exploration and exploitation within same units is paramount to ambidexterity success. Indeed, reliance on structural ambidexterity without putting in place good integration systems - whether at the top management or lines level - carries on the risk that the obtained different units will not be able to cooperate and collaborate, leading to the deterioration, instead to the creation, of value for the company (Eisenhardt and Martin, 2000; Smith and Tushman, 2005; Teece, 2007; O'Reilly and Tushman, 2008).

The second strand of work supports integration as the combiner of apparently opposite efforts toward a common scope. Integration is defined as comprehending all those mechanisms that make organizations to effectively implement activities of exploitation and exploration within the same unit. For instance, Gibson and Birkinshaw (2004) in developing the model of contextual ambidexterity focus on the creation of specific contexts for facilitating the simultaneous pursuit of exploration and exploitation without the need for spatial separation. Lubatkin at al. (2006) as well as Jansen et al. (2009) emphasize the role of top management team in encouraging and achieving the proper balance between integration and differentiation

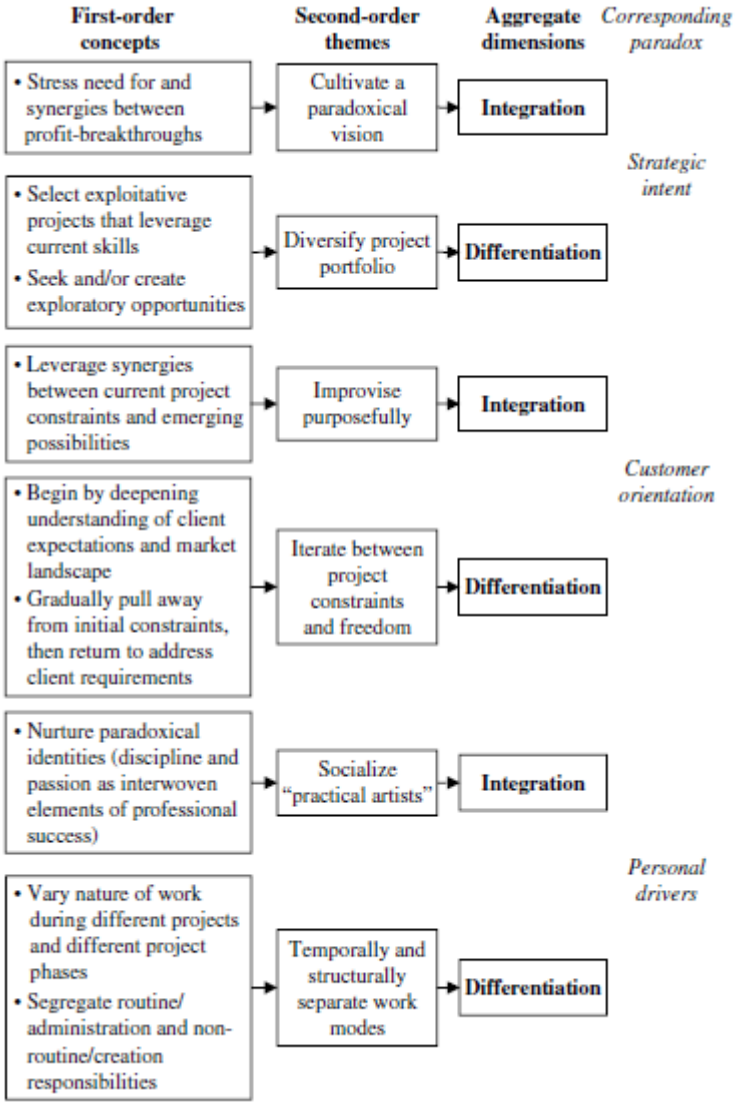
Critics to this approach sustain that individuals have human limits – such as bounded rationality, focus bias etc... – which make impossible to simultaneously accomplish tasks of exploitation and exploration. Limits lies also in personalities and attitudes, which spontaneously will lead people to prefer one or the other of these opposite activities. More than that, exploration requires a different set of knowledge as compared to exploration, and typically a different set of values to be embraced by employees.

Striving toward conflicting forces may also trigger traps, vicious cycles that derive by an increasingly one-sided focus on either exploration or exploitation. Organizations spontaneously tend toward homogeneity and find comfort in developing routines and mindsets supporting one form of business, escalating their efforts in the preferred modality to the neglect of the other. The need for combining differentiation and integration leads to a paradox difficult to solve. Paradoxes require a constant effort toward combining seemingly opposite forces, a cognitive endeavour toward a both/and approach rather than an either/or one. In addition, achieving a balance between differentiation and integration is all but an easy task. From the beginning, it must be clear that integration and differentiation are not alternative but complementary systems, subsequently the alignment between the two depends on the importance exploitation and exploration have for the company.

Differentiation diverts attention to each pole separately, whereas integration embraces tensions as synergistic and interwoven. Building on innovation and paradox studies, Adriopolous and Lewis (2009) theorize how the paradoxical interplay and management of these two activities fuel virtuous cycles of ambidexterity. The two scholars, taking

into examine five ambidextrous firms, made a comparative analysis of their exploitation-exploration strains and respective management approaches.

Figure 17: Tensions and corresponding management approaches



Source: Adriopolous and Lewis (2009)

Adriopolous and Lewis identified four main paradoxes that require differentiation and integration tactics.

As regards strategic intent, profit versus breakthroughs in strategic intent is the paradox of being profitable and creative at the same time.

Concerning customer orientation, firms should balance the extent to which it is necessary to be tightly coupled with customers' requirements or, on the contrary, more loosely coupled with them as to follow firms' own path. It consists in the discrepancy

between what firms believe should be done and what clients believe should be done. Speaking about personal drivers, they describe the conflict between discipline and passion as the conflict between control and structure and ardour and risk taking.

More than that, they describe three factors that can sustain ambidexterity in the struggle between integration and differentiation:

- Multilevel approach;
- Complementary tactics;
- Learning synergies.

Firstly, said paradoxes not only have implications for the organization at all levels but also have different implications with respect to each organizational level in examine. Consequently, by applying a multilevel approach, firms will limit the risk of providing misleading messages across the company. Secondly, differentiation and integration are two powerful complementary tactics. Usually individuals react to tensions in a defensive way by eliminating the source of anxiety – i.e. stressing exploitation or exploration only. On the opposite ambidexterity virtuous cycle builds on embracing both the forces, valuing their differences and their synergies. Tactical integration emphasizes the importance of both poles and foster paradoxical mindsets. Tactical differentiation helps companies in maximizing the distinct benefits of opposite poles. Thirdly, synergies at the learning level must be outlined and encouraged too. Along the lines of the dynamic capability concept, innovation demands attention to both existing knowledge and knowledge creation. Exploitative efforts make the knowledge to be transformed into commercial outputs, but without exploration firms will ends up by repeating same routines until becoming unable to change and eventually be surpassed by the market. Altogether these three factors contribute to the functioning of the ambidextrous virtuous cycle and proper interwove of integration and differentiation.

2.4.2 Individual versus Organization

Most researches on ambidexterity suggest ambidextrous mechanisms to be applied by the whole firms. Indeed, one often-made assumption is that companies need to enforce such organization-level mechanisms since requiring individuals to perform conflicting tasks exceed their capabilities. This assumption is especially evident if we consider the

model of structural ambidexterity. Some researchers downplayed this axiom to a certain extent by recognizing that some individuals within the firm are indeed required to be ambidextrous at the personal level: the leaders (Smith and Tushman, 2005). As shown, this was the case for leadership-based ambidexterity.

However, a different point of view is adopted by scholars embracing contextual ambidexterity. For example, we explained how Gibson and Birkinshaw (2004) seek to define a working context that facilitate employees in simultaneously pursuing both exploration and exploitation activities. In this sense, ambidexterity is not anymore conceived only at the organizational level, but also at the individual level. Contextual ambidexterity differs from leadership-based ambidexterity in the sense it believes everyone in the organization could be put in the condition of diverting their attention to opposite poles.

Obviously, being ambidextrous posits many challenges to individuals. Ambidextrous people are to be able to manage contradictory day-to-day requirements, changes in task, and conflicting objectives (Gibson and Birkinshaw 2004). Managers must be able to apply paradoxical thinking and cover different roles (Smith and Tushman, 2005). More than that, individuals performing creative and innovative activities as opposed to those accomplishing analytical and routine tasks are likely to differ also in terms of personality. Being able to perform both activities simultaneously, doing it well, and enjoying it, may imply incredible difficulties for the employees as well as frustration and confusion.

Apparently, there is nothing coming out of the blue in stating that managers should have both a long term and short term orientation, which perfectly suits the ambidextrous approach. Top managers must care of the business today and tomorrow. However, it is not well-clear how they could do so and, more than that, which personal characteristics should top managers have. Giving an answer to this question asks for an analysis of specific personality traits and attitudes that, by hypothesis, should belong to, or at list should be more prominent in, some individuals. Nevertheless, it is misleading to assume personal traits are more important than firms' structures, as much as it is erroneous to support the contrary. Organizational features have an impact on the firms' likelihood to achieve ambidexterity as much as individual features have. There two factors are likely

to interact and influence one another, adding further challenges to be overcome by the ambidexterity model.

Mom et al. (2007) affirm that a condition of success for innovation consists in the high level of information flows both bottom-up and top-down that spread from the organization as a whole to managers and vice versa. Gibson and Birkinshaw (2004) describe contexts that allow managers divide up their time between alignment and adaptability activities. Lubatkin at al. (2006) outlines how behavioural integration within the top management team helps in the management of contradictory forces. Moreover, with contingency rewards linking single manager remuneration with the one of the whole team it could be possible to enhance dialogue about ambidextrous tensions and foster the search for common solutions.

Though interrelated factors, organization ambidexterity is not the sum of individuals' personal ambidexterity. Only a small number of ambidextrous managers is actually able to integrate the results of explorations activities with the ongoing exploitative activities, especially when those activities happen separately and are pursued by mono-focused employees. In short, firstly managers should be ambidextrous individuals to a certain extent in order to be capable of leading an ambidextrous organization; secondly, ambidexterity varies from context to context; thirdly, organizational ambidexterity is supported but not limited to individual ambidexterity.

The relevance of investigating individual managers' ambidextrous capacity is emphasized by scholars that describe firms' likelihood to accomplish ambidexterity in terms of managers' creative activities, top managers' paradoxical thinking, managers' decision-making process, etc. Mom, Van Den Bosh and Volderba (2009) investigated managers' ambidexterity on a sample of 716 business unit and operational level managers and proposed – and subsequently tested, three complementary characteristics typically belonging to ambidextrous managers:

- "Ambidextrous managers host contradiction'', that is they are able to effectively deal with paradoxes, they have the motivation and capability to be responsive to and to pursue seemingly conflicting opportunities, needs, and goals.
- "Ambidextrous managers are multitaskers", that is they are able to handle multiple different tasks and different roles in a limited period of time, they can

carry out both non routine and routine activities, undertake roles linked with both competence deployment and competence definition, pursue both creative and collective actions, and typically think outside the boundaries of their job.

- "Ambidextrous managers both refine and renew their knowledge, skills, and expertise", that is they are able to obtain and effectively cope with very different kinds of information and knowledge, they recognize and assimilate not only explicit but also tacit know-how, and they are sensitive to both internal and external knowledge.

After having identifies these main features, the three scholars go on by studying the impact of formal coordination and personal coordination on managers' ambidexterity. Formal coordination refers to the extent of decentralization and formalization within the coordinating mechanisms implement by the company in examine. In order to define it, Mom and colleagues use two variables, namely 'decision-making authority' and 'formalization of managers' task'. The first variable describes the extent to which managers have authority over deciding which tasks to perform, which problems to prioritize and which goals to pursue. By increasing decision-making authority managers will be empowered and motivated toward a larger number of organizational, technological, and market opportunities. The second variable describes the extent to which codes and rules prescribe how to perform a particular task, how to evaluate issued and accordingly take decisions, and the extent to which managers must conform with this. High formalization is likely to reduce managers' responsiveness to new and contrasting stimuli and even emphasizes isolation between managers and their area of interests. These inferences were confirmed by the positive correlation between decision-making authority and ambidexterity, and negative correlation between formalization level and ambidexterity found in the Mom and colleagues' research.

Personal coordination mechanisms refer to all those systems, which can be considered more or less formalized, associated to building personal relationships between organizational members such us direct contact, periodical meetings, task forces, teams, and liaison roles. The two variables used by authors for personal coordination are 'participation in cross-functional interfaces by manages' and 'connectedness of a manager to other'. The first consists of all lateral integration mechanism applied by companies and is likely to increase managers understating of conflicting goals and

interests in the company as well as gaining the full picture of opportunities the company could decide to be engaged in. The second describes the network managers have that connects them across organizational hierarchy and units in terms of density and size. It effect manager's capability to acquire diverse knowledge and insights.

Altogether, proper formal coordination and personal coordination, i.e. mechanisms for organizational ambidexterity, enhanced the opportunities ambidextrous individuals have in the organization to succeed.

2.4.3 Static versus Dynamic

Many studies promote the simultaneous ambidexterity model (e.g. O' Reilly and Tushman, 2004; Gibson and Birkinshaw, 2004). These studies describe a static model which should allow companies to simultaneously achieve exploration and exploitation through a specific organizational structure. In this sense, companies should be able to reach an ideal ambidextrous system configuration. However, contingency theory shows us that companies are likely to need to continuously reconfigure themselves in order to stay competitive in the market and avoid failure. A perfect static configuration is something that might seem appealing in theory but that will not work in real life. Therefore, it is unlikely that one organizational structure could successfully deal with the entire range of circumstances that companies face in their business life.

Dynamic capabilities involve and integrate both static and dynamic components. Indeed, the interaction between exploitation and exploration is supposed to be conceived as a dynamic capability. Orchestrating firm resources for the simultaneous accomplishment of exploration and exploitation might thus become a dynamic task rather than a matter of static alignment. As regards structural ambidexterity, it remains unclear how structurally differentiated units could evolve through time to keep ensuring both differentiation and integration. There might be changes in the relationship between top organizational levels and differentiated units in terms of where to allocate more resources and which objectives to prioritize; or there might be changes in the relationships between units themselves as some companies might decide to keep them separate only for a certain amount of time and then fully integrate them back together, or the units itself might end up in changing due to different requirements coming from

the market.

Also contextual ambidexterity has dynamic components even if they have been usually downplayed. Dynamicity is mostly managed by individuals themselves who can decide how to allocate their time and attention, thus exploitation and exploration could be pursued simultaneously or sequentially up to individuals' decisions.

In sum Raisch et al. (2009) argue that the management of ambidexterity involves a dynamic configuration rather than a static one and that, in order to maintain ambidexterity through time, they might be required both structural and contextual solutions, and both simultaneous and sequential approaches.

Taylor and Helfat (2009) investigated the process of technological transitions in order to gain more insights over the ambidexterity issue. Indeed, when facing a technological change, firms confront themselves with the ambidextrous challenge of exploiting current assets and support the development of the new exploratory technology. The two scholars demonstrate that ambidexterity lies in the on-going alignment of activities organizations undertake during the technological transition phase. They argue that such transition requires ties between units in charge of the company's progress in the new technology and units responsible for the complementary assets necessary to commercialize the innovation. Complementary assets consist of all those tasks, resources, and activities that companies need to earn profits from innovations.

As we saw in the chapter, many authors in providing hints for achieving ambidexterity suggest to isolate and separate from the company those units and employees in charge for innovating. On the opposite, Taylor and Helfat sustain that the exploitation of the exploration activity and resulting innovation requires strong interdependence between existing complementary assets and new one. Nevertheless, innovations might imply changes in the current complementary assets or even their complete loss in value. Three principal ties' typologies have been identified by the authors:

- Intracomplementary linkages: ties between units or teams responsible upon existent and novel functions as regards one specific complementary asset (e.g. existing direct distribution systems to new indirect distribution channels);
- Core-complementary linkages: ties between complementary units and teams responsible of the development of the new technology (e.g. new product

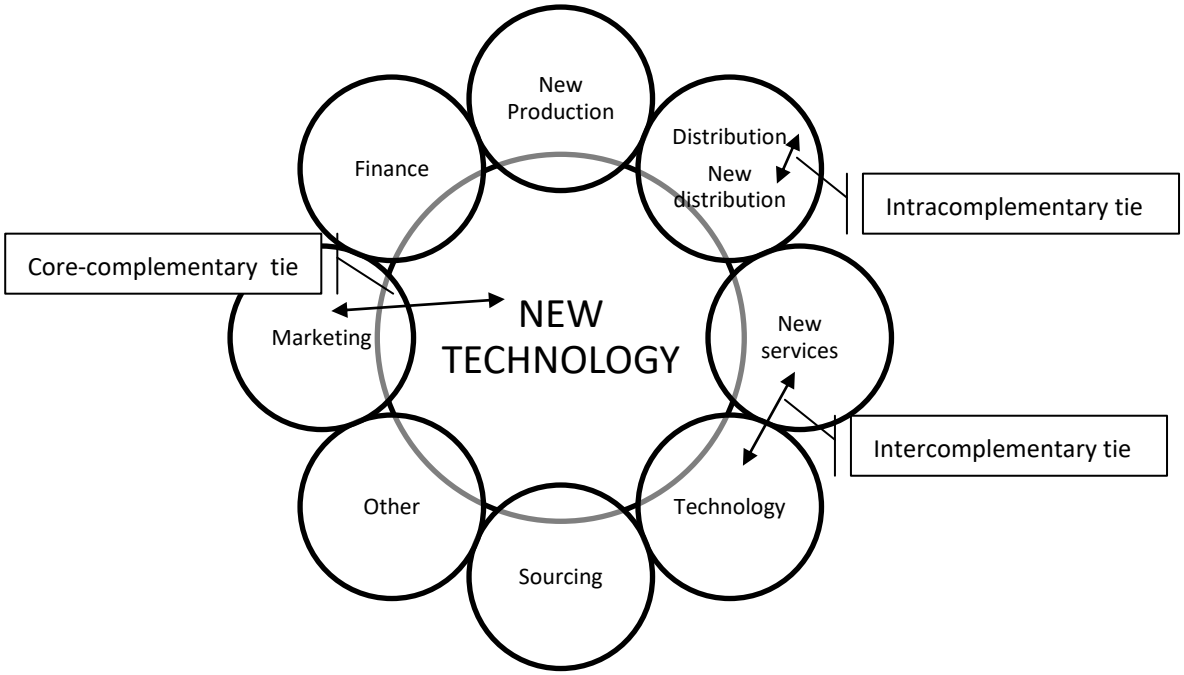
introduction by the development group to existing salesforce expertise and sales strategy);

- ❖ Intercomplementary linkages: ties between units and teams responsible upon different complentary assets (e.g. new service requirement to existing technology).

Managers have the role of managing the links between different units and assets in these transitory phases.

Figure 18: Ties between new technology and complementary assets

- here requiring new production, new distribution, and new services systems



Source: Personal Elaboration of Taylor and Helfat (2009)

2.4.4 Internal versus External

Another way for resolving the exploitation-exploration paradox that has been suggested throughout the literature is the outsourcing of one or the other activity to an external party. This possible solution has been further emphasized by all the pool of researches which outlines the importance of the external acquisition of information and new knowledge, especially on the exploration side, to contrast the stagnation of internal knowledge (Eisenhardt and Martin, 2000). From the observation and recollection of

external know-how, indeed, can born new combinations of internal knowledge. In this sense, companies should be able to both recognize external useful knowledge and to absorb and integrate it within firms' boundaries. Other researchers, however, stressed the risks outsourcing implies in terms of loss of core activities and integration challenges (Benner and Tushman, 2003).

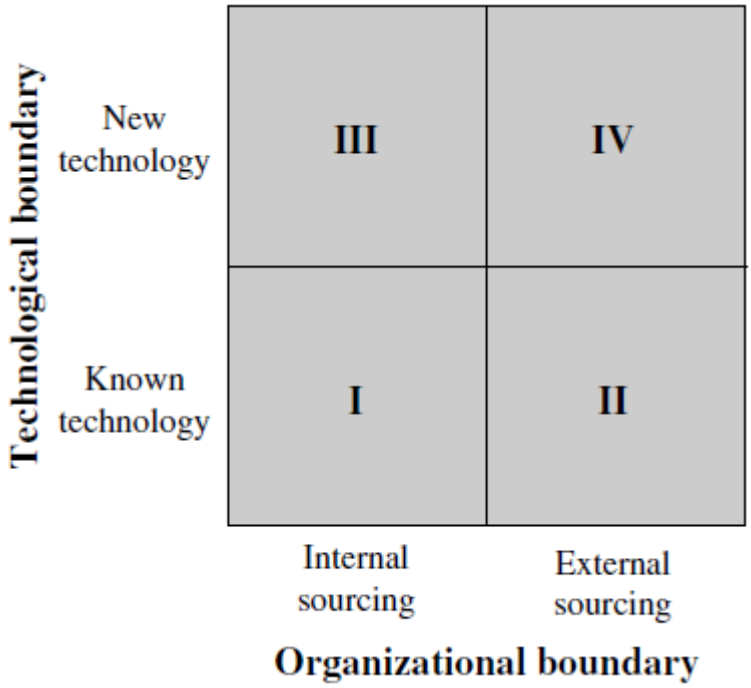
Recently, a growing interest, both academic and managerial, has surrounded organizational networking especially in terms of acquisition of knowledge and novel perspectives. Managers in these cases are in charge of enlarging firm's boundaries and integrate external and internal resources. Ambidexterity shall therefore involve the managerial challenge of not only finding appropriate equilibrium between exploitation and exploration but also of combining internal and external knowledge (Raisch et al., 2009). External social relationships enhance knowledge acquisition, whereas internal social relationships support knowledge diffusion. Consequently, ambidexterity might arise from complex social networks within which companies balance contradictory ambidextrous forces as a group in its entirety. Ambidexterity involves complementary internal and external relationships.

Rothaermel and Alexandre (2009) apply ambidexterity to the technology sourcing strategy. Technology can be defined as the practical application of knowledge with commercial or industrial goals. As such, first firms face a knowledge-boundary with respect to technology: it can build on existing knowledge or new one. Second, they face an organizational boundary: needed knowledge can be obtained internally to the enterprise or externally. In Rothaermel and Alexandre, one company that develops its technology only internally will not be able to significantly improve its performance through time, but the same can be said for firms solely relying on external sources of innovation. The trade off here occurs between internal sourcing, which usually focus on known technology, and external sourcing, which typically lead to new technologies. Along these lines, four main combinations of exploitation and exploration arise. Moreover, they indicate the absorptive capacity as a key in their model in order to fully take advantage of the overall knowledge gained.

The critical issue regards management decision about how to balance and dynamically adjust internal versus external technology sourcing in light of changing circumstances.

To provide greater theoretical basis to this issue, the two authors applied the exploitation-exploration framework by March (1991) of organizational learning to technology sourcing and create the following schema.

Figure 19: Types of Exploitation and Exploration Along Technological and Organizational Boundaries



Source: Rothaermel and Alexandre (2009)

1 Quadrant: The firm internally sources known technology, it means it is pursuing internal exploitation;

2 Quadrant: The firm externally sources known technology, it means it is pursuing external exploitation;

3 Quadrant: The firm internally sources new technology, it means it is pursuing internal exploitation;

4 Quadrant: The firm externally sources new technology, it means it is pursuing external exploration.

However, companies are not facing static circumstances, and the pursuit of only one of the four options is far from being enough. Companies must address the tensions arising from the exploration-exploitation trade off and from the internal-external sourcing trade off. Therefore, ambidexterity in technology sourcing requires managers to combine

internal and external sources of existing and new knowledge simultaneously. Further, the two scholars found that companies characterized by greater levels of absorptive capacity gained largely greater benefits from ambidexterity. Indeed, absorptive capacity allows companies to mitigate the tensions between exploitation and exploration and improves the management of external and internal knowledge.

Today is almost impossible for companies to detain all the needed knowledge within their own boundaries. More than that, being able to capture external knowledge has proved to be an advantage rather than a threat for firms' competitiveness. There are many factors that contribute to the shift companies are undertaking from closed innovation systems to open ones, for instance employee mobility and the increasing amount of expertise to access. This led firms to seek for a model able to bring together external and internal knowledge through alliances, license, joint ventures, mergers and acquisitions.

2.5 Conclusions

After what we saw in this chapter we can claim that ambidexterity is a dynamic capability which allows organizations to accomplish the two conflicting activities of exploration and exploitation. Due to its inner contradictory nature, ambidexterity concept is swept by tensions: it involves both internal and external knowledge, it requires mechanisms for differentiation and for integration, it asks for organizational and individual level of analysis, and it look for a static model while being in need of dynamicity and adaptation capacity.

Further, ambidexterity is not a mere issue of organizational structure or governance, but it requires the creation of values and compelling vision pushing for both alignment and adaptability. Along these lines, we saw how, within the field of simultaneous ambidexterity, the structural model focuses on organizational structures for the achievement of both exploration and exploitation's advantages, the leadership-based model emphasizes governance and guidance, and the contextual model claim that critical is the establishment of the proper values and culture. Differently, sequential ambidexterity posits for the alternation in time of exploitation and exploration activities as to minimize conflicts within the company.

It is not surprising therefore that literature developed various and different models in seeking the perfect configuration for ambidexterity, and that, however, agreement is far to be achieved and final decision about which model to apply is likely to be determined by the peculiar environmental circumstances and firm's characteristics.

3. IT-Business Relationship: The BiModal Approach

Nowadays, firms face a challenge known as ‘digitalization’ or ‘digital transformation’ of society, which consists in the application of digital technology in all aspects of human life. Digital transformation enables and produces new types of innovation rather than simply supporting and enhancing those innovations brought up by traditional means. As a reaction to this, in last years companies felt the need of a new perspective on the IT function, ranging from the establishment of new digital IT units to the increase in business competences and responsibilities for the IT department. These changes are thought to allow the organization to be better informed, faster and more flexible in enabling IT and IT-related services to cope with novel customers’ needs and market opportunities.

Since the success and economic applications of IT megatrends in social, mobile, analytics and cloud computing, it seems that potentially everything might be subject to digitalization. Enterprises shall take advantage of the developments in the IT field and pursue digital innovation to improve or change their business model (Diallo et al., 2014). IT is seen as a nexus of forces that supports companies in their struggle for prosperity and that simultaneously accelerates changes and emergence of new digital solutions. Accordingly, many firms feel the pressure to accomplish a digital transformation, and this pressure exacerbates due to rapid changes in both external customers’ and internal users’ preferences and expectations. In order to cope with these difficulties while maintaining the business efficient, some companies are trying to pursue ambidexterity at the IT level, making traditional IT and innovative IT to live together. The coexistence of traditional IT and innovative IT has been coined as ‘bimodal IT’, as we will explain deeper later.

Many firms struggle with the implications of digital transformation since it might lead to a loss of control and might constitute a threat to commoditization and standardization. Often firms face many difficulties in the attempts to accomplish organizational digital transformations due to well-settled IT infrastructures and inflexible structural and cultural separations between business management and IT.

Therefore, concepts like business-IT alignment and management of the IT function itself need to be rethought for this changing business environment.

In the first part of the chapter we are going to provide some brief insights about the complex relationship between the IT and the business that has been questioned under many aspects both by scholars and managers since the first implementations of technologies for business purposes. We will focus on the literature that was produced after the year 2000. Indeed, it is in the last two decades that major changes occurred in digital technologies which brought to an increase in complexity of IT-related issue and in the IT-business relationship. Secondly, we will see how these alterations in the business environment lead to the conceptualization of the digital business strategy, which implies the elimination of the separation of the business strategy from the IT strategy and the rationales behind the pursue of a digital business strategy, rather than a plain business strategy. Along these lines, we will concentrate on the model of bimodal IT, which was described for the first time by Gartner in 2014, as an effective system to cope with the several complexities the IT department is facing in these days. Bimodal IT brings up further considerations about the extent to which business strategy and IT strategy are related and should merge for firms' survival, as well as it diverts the attention to the many and different challenges that CIOs and IT departments are living internally to the function in the majority of sectors and industries.

3.1 Business – IT Relationships

Business - IT relationship's importance for companies' success is anything but new, as well as the possibility of shaping said relationship in different manners. Already three decades ago, Huber (1990) pointed out how it was critical to review the IT role within organizations both in academic literature and managerial practice. The world was changing. Huber (1990) argued that the most part of the academic and managerial knowledge concerning the various elements that have an impact on organizational processes, structures, and ultimately performances, was developed and internalized in a period in which information technology was constant in its characteristics and basically common to all sectors. When some technologies were introduced, the most affected part of society happened to be the work place. However, through the years not only technology spread in all functions and divisions of any type of enterprises, but it also spread to all aspects of society altering the way in which people live and interact.

In these years of massive technological development, scholars and managers have exchanged many different views as regards how information technologies can be used for business and what should be their role into organizations.

The claim that strategy determines the role and function of the information system within companies may be easily upturned: the company's information technology can be the driving factor for the determination of the new organizational strategies. Along these lines, information technologies may not only constitute one of the primary variables in shaping business strategies, but also a discloser and determinant of new opportunities. In the IT era, it is increasingly apparent that a tight relationship exists between information systems and business strategies. Said relationship must be based on the attempt to achieve the optimal alignment between technologies, organizational needs, and strategic development. Nowadays, companies themselves have changed and are changing their vision of the IT function, moving from seeing it as supporting and assisting the business to conceptualize it as an integral part of the business itself. Indeed, what it is critical to the understanding of the IT revolution is that information technologies' diffusion does not merely deal with the increase in the adoption rate of these technologies per se', but with the diffusion and adoption of strategic and structural innovations – such as new business models and new organizational architectures –

based on information technologies. Today enterprises seek to obtain a bidirectional reciprocal exchange between the business side and the IT one. As a consequence, on the one hand, it is necessary to make information technologies closer to the characteristics and needs of the company, on the other hand, the firm must be prompt to understand and exploit substantially information technologies and the innovation they might bring.

The radical influence that IT exerts on the totality of organizational elements posits necessary an analysis on the way IT relates with the business. How can IT facilitate organizations in creating, acquiring, combining, and transferring existing and new knowledge throughout all the relevant actors? How may IT help companies in remaining flexible and adaptable toward the different internal and external stimuli while being efficient? In other words, how companies can – and must – use IT and IT-related features to develop dynamic capabilities and achieve ambidexterity?

3.1.1 Strategic Processes for IT-Business Development

As regards business strategy and information technology, in these years literature mainly focused how their matching could promote dynamic capabilities and how and which type of information technologies are the ones to be deployed for specific results. As stated by Sambamurthy, Bharadway and Grover (2003) firms are increasingly leaning on information technologies to foster their agility, including communication, knowledge, and process technologies. In order to understand the impact of IT competences and strategic process on the final performance, they focus on two features of firms' competitive actions, namely the number of competitive actions, described as the number of competitive innovations in novel services, products, distribution channel, or market segment, and the complexity of the action repertoire, described as the richness and variety of competitive actions. In their model they identify three IT competences as key antecedents for dynamic capabilities:

- Agility: "The ability to detect opportunities for innovation and seize those competitive market opportunities by assembling requisite assets, knowledge, and relationships with speed and surprise". With this definition, the three authors seem to encompass the concepts of exploitation and exploration (March, 1991; Gupta et al., 2006), and search depth and search scope (Katila and Ahuja, 2002)

simultaneously. Further, they propose three dimensions that collectively contribute to business agility and the role IT should have for each of them, as disclosed in the table below.

Table 6: Types of Agility

Types of Agility		
Type of Agility	*Description*	*Role of IT*
Customer	Ability to co-opt customers in exploration and exploitation as sources of innovation ideas, concrete of innovation, users in testing ideas or helping other users learn about the idea	Technologies for building and enhancing virtual customer communities for product design, feedback and testing
Partnering	Ability to leverage assets, knowledge, and competencies of suppliers, distributors, contract manufacturers and logistics providers in the exploration and exploitation of innovation opportunities	Technologies facilitating inter-firm collaboration, such as collaborative platforms and portals, supply-chain systems..
Operational	Ability to accomplish speed, accuracy, and cost economy in the exploitation of innovation opportunities	Technologies for modularization, and integration of business processes

Source: Sambamurthy, Bharadway and Grover (2003)

- Digital options: "A set of IT-enabled capabilities in the form of digitalized enterprises work process and knowledge systems". IT is a digital option generator. Digital options consist of digital processes and digital knowledge, which would not exist without the involvement of IT and IT-related features. The digitalized process capital consists in the IT-enabled inter and intra-organizational processes for automating, informating and integrating activities. Digitalized knowledge capital is the IT-enabled repository of knowledge and consists of mechanisms for making members to interact, share perspectives and expertise, internalize, combine and generate knowledge.
- Entrepreneurial alertness: "The capability of a firm to explore its marketplace, detect areas of marketplace ignorance and determine opportunities for action". It recollects us of the sensing activity as defined by Teece (2007). It encompasses strategic foresight, which is the capacity to anticipate discontinuities – i.e. opportunities to be filled – in the business environment; and systemic insight,

which is the ability to recognize the connections between firm's digital options, agility capabilities, and market opportunities to architect proper competitive action.

Sambamurthy, Bharadway and Grover also identify three strategic processes which are decisive to firms for the exploitation of IT systems in an ambidextrous perspective:

- Capability building process: The capability-building process is coherent with the logic of leveraging[1] and focuses on the relationship between digital options, agility, and entrepreneurial alertness in the sought of dynamic capabilities' development. In this sense, it mainly refers to the exploitation of IT competences for enhancing and seizing business opportunities and mostly utilizes systemic insight to identify current complementarities between organizational business processes, IT competences, and firm's knowledge. However, it also takes advantage of entrepreneurial alertness and strategic foresight to recognize the business value and opportunities available in and accessible through information technologies. Entrepreneurial alertness is needed for two steps of the process: the conversion of the IT competence into digital option, and its following conversion into agility.
- Entrepreneurial action process: The entrepreneurial action process is coherent with the logic of opportunism[2] and focuses on the connections between entrepreneurial alertness and agility and their creative mix for the launch of competitive actions. As such, it seeks to sense new opportunities in the market and use strategic foresight and system insight to explore and fulfil market gaps.
- Coevolutionary adaptation process: The coevolutionary adaptation process is based on the learning-by-doing process that firms enact through organizational experiences as they develop agility and digital options and launch different competitive actions. This process overall builds on the processes of capability-building and entrepreneurial action and constantly revitalizes the dynamic

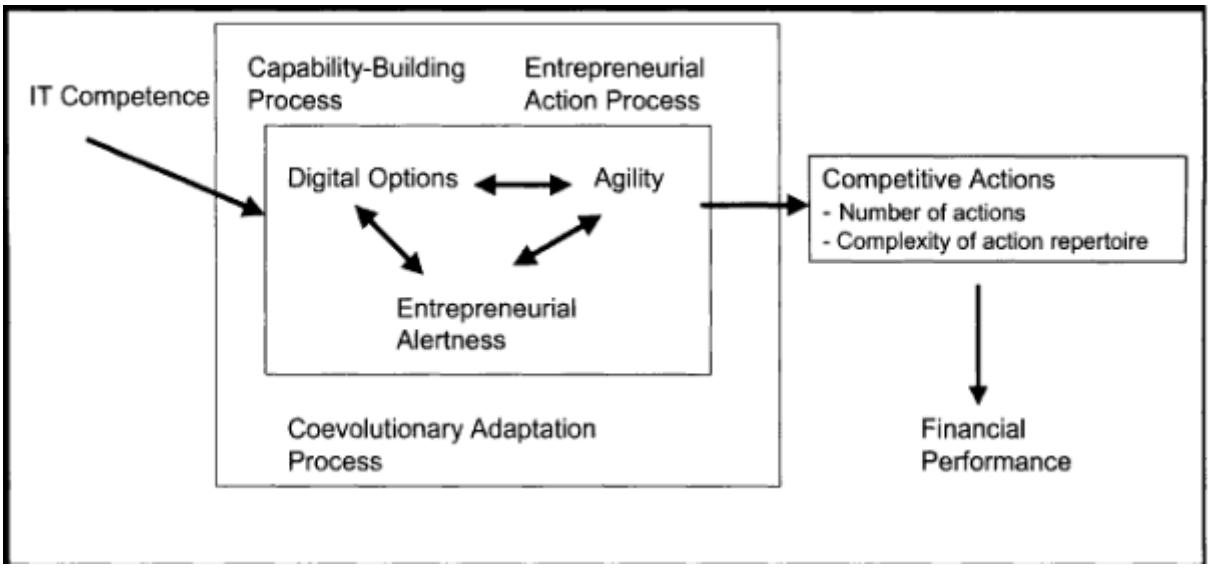
[1] As defined by the Sambamurthy, Bharadway and Grover (2003) with references to Barney (1991) and Makadok (2001), leverage logic affirms that companies' performance is given by the distribution and use of valuable inimitable resources. It is based on resource-picking and capability- building mechanisms.

[2] As defined by the Sambamurthy, Bharadway and Grover (2003) with references to D'Aveni (1994), Lengnick-Hall and Wolff (1999) and Young et al. (1996), opportunity logic affirms that superior performance is obtained through ongoing innovation and competitive actions.

capabilities of digital options, entrepreneurial alertness and agility, influencing and shaping the future developments of the business and IT competences.

All the three processes involve both research phases and taking-action.

Figure 20: Relationship between IT Competences and Business Performance



Source: Sambamurthy, Bharadway and Grover (2003)

With this model, the three authors suggest a dynamic and integrated perspective on IT and business capabilities, actions, and strategies. Firms should reshape the questions on the IT function's strategic role and value in terms of digital options, agility capabilities and competitive actions, and ensure that processes are properly deployed and enforces.

3.1.2 IT, Business Strategy, and Performance

As said, information technology plays a key strategic role into enterprises. Already in 1999, the GartnerGroup's annual survey outlined the alignment of information technology with business objectives among the top ten issues in technology management.

In order to achieve better insights on the role technology has with respect to companies' performance, Croteau and Bergeron (2001) asked themselves how firms should distribute and apply their information technology with respect to their business strategy. They used an empirical study, made of the analysis of two different questionnaires completed by the top managers of 223 organizations, to determine which typologies of

technological deployment are specific to certain types of business strategies and consequently best support the firms' performance.

They applied the typological approach by Miles and Snow (1978) to business strategies, which identifies four types of business strategies: prospector, analyser, defender and reactor. The prospector firms focus on exploration, seek to innovate and lead the changes in their market, they operate in dynamic, growing and changeable contexts. The defender firms focus on exploitation, they emphasize quality at low cost, operate in stable contexts and seek to obtain larger portions of market shares through, for instance, standardization, vertical integration, production efficiency, cost control. The analyser firms focus on differentiation, they seek to remain competitive and to keep their market shares in their respective niches while at the same time remaining responsive to stimuli in terms of new services and clients, they share some features with both the prospector and the defender companies. The reactor firms do not have a clear strategic route nor organizational structure, they mainly react to the context while not being able to take advantage of upcoming opportunities. Companies choose the strategy to apply according to the perception they have of the environment. In their study, Croteau and Bergeron (2001) associate the four business strategies to the actions taken by the firm to achieve its goals - they considered only realized business strategy, not merely intended one. Along these lines, they translate the four mentioned business strategies in strategic activities.

Technological deployment refers to the way companies manage and plan the use of its information technology to benefit from its potentialities and improve effectiveness. Croteau and Bergeron (2001) highlight seven features that characterize technological deployment and that can be deployed to different extents with respect to company's needs. The first feature consists in the strategic use of information technology, which refers to the application of IT for gaining a competitive advantage, reducing the competitive disadvantage and/or meeting firm's strategic objectives. The second feature is the management of information technology, which consists of the different activities carried out by the IT department. Third, the role of the IS department refers to the importance that is given to the IT department at the organizational level, to the effectiveness of software development, the administration of the communication networks, and the quality of the IT-Organizational structure alignment. Fourth, the

technological infrastructure refers to the IT formalized procedures and the IT architecture in place to lead and manage enterprise's IT resources. Fifth, the organizational infrastructure consists of the internal functioning, processes, structure etc of the IS department. Sixth, the administrative infrastructure addresses the IS department's managerial policies. Seventh, technological scanning deals with the acquisition, analysis, and diffusion of IT information and knowledge within the company with the aim of increasing competitiveness.

Different levels of organizational performance are given by different levels of alignment between the business strategy and the technological deployment. Indeed, as said, the study by Croteau and Bergeron was developed to answer to the question: Given a type of business strategy, which profile of technological deployment best help firms to boost their performance?

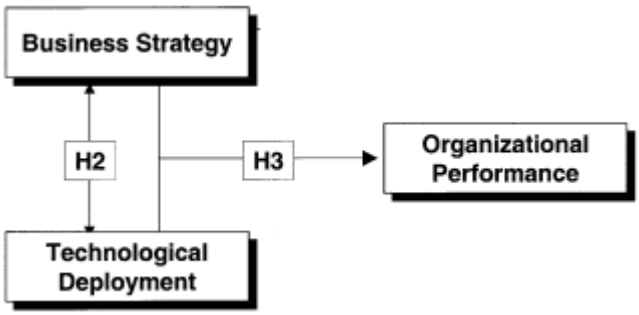
It is important to notice that the authors built a model allowing for both business strategy and technological deployment to be mediating variables, meaning to be the variable only directly impacting final firm performance. Under one instance, technological deployment constitutes the independent variable that effects business strategy, which is the mediating variable in this case, and which in turn influences organizational performance (dependent variable). However, the reverse is also true: the business strategy can be the independent variable that impacts technological deployment, which now constitutes the mediating variable, and which in turn affects organizational performance (still dependent variable). This emphasizes the fact that information technology might be among the prime influencers of strategy, or among those organizational features being influenced by strategy.

In the interest of our research, we take into consideration two of the three hypotheses made by the authors:

6 Feature: There is a profile of technological deployment specific to each type of business strategy;

7 Feature: For each type of business strategy, the more specific the profile of technological deployment, the better the organizational performance.

Figure 21: The Croteau and Bergeron (2001) Model



Source: Personal elaboration of Croteau and Bergeron (2001)

Hypothesis 2 looks for technological deployment features to be specific to the different types of strategic activities. A positive and significant relationship was found between the prospector and the analyzer strategic activities and technological deployment; a negative and significant relationship between the defender strategic activities and technological deployment; and no relationship was observed between technological deployment and the reactor strategic activities. Moreover, the results made it possible to make a distinction between two profiles of technological deployment: one outward oriented which includes technological scanning and is positively related with the analyzer strategic activities and negatively related to the defender strategic activities; and one inward oriented positively related to the prospector strategic activities. Hypothesis 3 focuses on the relationship existing between different technological deployment profiles and the organizational performance for each of the strategic activities. The outward profile of technological deployment was found to boost organizational performance for analyzer strategic activities, while, even if positively related, it did not appear to impact significantly the performance for defender strategic activities.

The study was developed targeting specific business strategies' typologies taken on their own. However, ambidexterity implies that companies should be able to pursue different and even contradictory objectives and, therefore, carry out different strategic activities simultaneously. In particular, firms are likely to promote both a prospector and analyzer approach. It is important to understand which technological deployment profiles will be useful for each strategic activity to avoid wasting for resources and time. It is also important to keep in mind that technological deployment might come first, and

strategy follows, as was already suggested by Croteaou and Bergeron and as we are going to explain deeper in next section.

3.1.3 Digital Business Strategy

In the last decades, the information technology strategy was broadly perceived as a functional level strategy. Along the lines of the well-known alignment view[3] (Henderson and Venkatraman, 1993), IT strategy was supposed to follow and be subjected to business strategy. However, recently alongside this prevailing view another one begun to emerge, according to which IT acquires a more relevant role. Improvements in information systems, communication, and connectivity triggered new perspectives on IT importance, functionalities and tasks. Digital technologies are substantially transforming firms' capabilities, products and services, organizational processes, business strategies, and interfirm relationships, spanning different industries and sectors. Bharadwaj, El Sawy, Pavlou, and Venkatram (2013) argue it is time to merge business and IT strategy. They term this fusion 'digital business strategy' and define it as an "organizational strategy formulated and executed by leveraging digital resources to create differential value". With this definition they seek to overcome the traditional alignment view and to highlight the pervasiveness of digital resources in the most of organizational functions, to embrace the concept of 'digital resources' which is broader than mere technologies, and to heighten the performance implication of a proper IT strategy from supporting productivity and efficiency to boosting competitive advantage and differentiation. Thereby, they clearly associate digital business strategy to the creation of business value.

Finally, they identify four concepts critical to the understanding of the digital strategy importance:

- Scope of the digital business strategy;
- Scale of digital business strategy;
- Speed of digital business strategy; and

[3] Henderson and Venkatraman (1993) defined the Strategic Alignment Model in terms of four fundamental areas of strategic choices: business strategy, information technology strategy, organizational infrastructure and processes, and information technology infrastructure and processes. In it the business strategy is seen as the driver and the IT strategy as the enabler.

❖ Source of business value creation and capture in digital business strategy.

Conceiving competitive strategy through digital resources requires questioning the change in business scope that digital technologies' impact might imply for companies. The corporate scope defines the portfolio of products, businesses and activities that are carried out within the firm's control. Determining the scope of digital business strategy involves a better understanding of the way in which digitalization affects relationships between functions, divisions, and activities within the same company and between companies.

First of all, it is important to stress out that digital business strategy is trans-functional: all of the process and functional strategies are embodied by digital business strategy and the digital resources serve as the tier. As such, IT strategy can be considered a functional-level strategy, but digital business strategy should be treated similarly to business strategy. The four authors forecast that in the near future there would be no distinction between business strategy and digital business strategy.

Second, digital business strategy scope encompasses digitalization of products and services and the information related to them. Many firms are starting to recognize the power of digital resources to tailor their product and service strategy. Corporate scope should be adjusted to benefit from the developments in hardware, software, and internet connectivity, instead of treating physical and digital domains as two unconnected domains.

Third, the digital business strategy enlarges the organizational scope beyond firms' boundaries and supply chains to firms' networks and ecosystems. Digital business strategy may involve loosely coupled dynamic ecosystems and this implies a more data rich, dynamic, and multifaceted strategy to be shared between different actors, whether partners or competitors.

Companies benefits from scale effects typically thanks to a reduction in unit cost and consequent enhancements of profitability. In a digital business, corporate scale must not be conceived only in terms of geographic coverage, supply chain, and physical factors of production, but rather also digital factors must be kept in mind. For instance, cloud computing services allow companies to rapidly scale down or up their infrastructures using a shared pool of configurable computing resources; digital products and services have disclosed greater connections and network effects, when the whole business turns

digital, companies should carefully take into account the role of network effects and multisided business models; it may come spontaneous to say large scaling options might become available through alliances and partnerships based on shared digital assets even across traditional industry borders. Finally, all these features together with digital intensity, connectivity and big data, creates an era of abundance of data, information, and knowledge at the disposal of the enterprise that will be able to reap the advantages.

Digitalization increased dramatically firms' attention toward speed. Thanks to richness of data collection, improvement in communication, and the development in analysis tools and computing capabilities, firms are able to boost their speed of new product launches and forecast and plan product launches to stay competitive. Moreover, product launches are likely to be coordinated in networks of complementary digital products services. More than that, digitalization allowed firms to optimize their worldwide supply chains and increase efficiency. With a digital business strategy at the network level, the speed of supply chain orchestration is likely to improve altogether with the speed of network formation and adaptation. Finally, better information management, fasten communication, and subsequent investment in organizational processes aimed at driving out the more of the business value from this data, enhance the speed of decision making at the different organizational levels.

Digital business strategy enlarges the sources of business value creation and capture by expanding the sources of value from both physical and digital. Digital business context creates opportunities for companies to tailor their business offerings on the basis on information accrued through Facebook, Twitter and other channels. Moreover, thanks to products and services' interactions at different levels, multisided digital business models lead firms to capture value at different levels (e.g. Google gave away Android software for free but capitalize on its ability to control advertising).

Table 7: Digital Business Strategy Themes

Scope of Digital Business Strategy
• The level of fusion and integration between IT and business strategy; • How effectively digital business strategy encompasses the whole organization and transcend traditional functional and process silos; • The extent to which digital business strategy exploits the digitalization of products and services and the information around them; • The extent to which digital business strategy exploits the extended business ecosystem.
Scale of Digital Business Strategy
• The extent to which IT infrastructure can scale up and down rapidly and cost effectively to enable digital business strategy to boost strategic dynamic capabilities; • The extent to which the digital business strategy leverages network effects and multisided platforms; • The extent to which digital business strategy takes advantage of data, information, and knowledge abundance; • How digital business strategy can scale volume through alliances and partnerships.
Speed of Digital Business Strategy
• The extent to which digital business strategy accelerates new product launches; • How effectively digital business strategy speeds up learning for improving operational and strategic decision making; • How effectively digital business strategy bolsters the speed of supply chain orchestration; • The extent to which digital business strategy enables the formation of new business networks that provide complementary capabilities quickly; • How effectively digital business strategy speeds up the sense and respond cycle.
Sources of Digital Business Strategy
• The extent to which digital business strategy leverages value from information; • The extent to which digital business strategy leverages value from multisided business models; • The extent to which business strategy captures value through coordinated models in networks; • The extent to which digital business strategy appropriates value through the control of organization digital architecture.

Source: Personal elaboration of Bharadwaj et al. (2013)

Considering all these advantages that come from business digitalization, it is not surprising the interest that firms and literature is dedicating to the topic. However, the path companies have to undertake toward digitalization is still unclear and full of obstacles and challenges. Different solutions have been given by different analysts through years. One of the more recent ones comes from the consultancy company Gartner, which has always kept a watchful eye on IT and IT-related issues, and consists in what is now known as ‘bimodal IT’.

3.2 BiModal IT

In response to digitalization, companies reacted in different ways depending on their needs by establishing new digital units, by shifting information technologies' responsibility to the business units, or by merging IT and business objectives. As now it might be well-understood, these changes should lead the enterprises to be better informed and more responsive to market opportunities and customer needs thanks to IT and IT-enabled services, products, decision-making processes, organizational features etc. With digitalization driven by and based on the spread and success of IT in social, mobile, analytics, and cloud computing reaching almost anything in society, companies need to understand how to optimally exploit these IT-related new features as the strategic nexus of internal and external forces (Diallo et al., 2014). As a consequence, a new scenario is foreseen in all industries and sectors, where the pervasiveness of information technologies will lead the IT capacities not to be strictly related to specialized insiders anymore but to be enlarged to a broad range of organizational functions and items.

Digital business posits new challenges to the IT departments. In some cases, the digital transformation leads firms to two different paces or modes of speed in the IT and IT-related features, the so-called 'two-speed IT' (Horlach et al., 2016). In order to undertake a digital transformation, companies establish a fast-costumer facing and business-oriented IT. However, alongside this 'dynamic IT', firms keep on running the 'classical IT' with the entrenched IT infrastructure and organization. This latter IT works at a lower speed and in longer cycles, since it is manly linked to the functioning of the current business and it runs large core systems, which cannot be modified easily. The former IT is, on the contrary, characterized by dynamicity and prone to innovations. In addition, apart from different speed and pace of change, both ITs operate with different organizational structures and methods. Thus, many companies switched to a 'bimodal IT' organization with different processes, governance mechanisms, and organizational structures to respond to the dual requirements that come from the business. The term 'bimodal IT' is more comprehensive than the 'two-speed IT' one since it embraces the elements not only related to different speed but also those associated to different processes, architectures, and governance structures in both parts.

3.2.1 Definition and characteristics

The concept of bimodal IT is inextricably attached to the analyst firm Gartner, the first who brought it to worldwide attention. According to Gartner, the bimodal IT is defined as "the practice of managing two separate, coherent modes of IT delivery, one focused on stability and the other on agility. Mode 1 is traditional and sequential, emphasizing safety and accuracy. Mode 2 is exploratory and nonlinear, emphasizing agility and speed" (Gartner 2015a).

Table 8: Characteristics of Bimodal IT

Think sprinter

Mode 1 (Traditional/Core IT)		**Mode 2 (Dynamic/Agile IT)**
Reliability	*Goal*	Agility
Price for performance	*Value*	Revenue, brand, customer experience
Performance and security improvement	*Trigger*	Short term market trends, innovation
Waterfall, V-Model	*Approach*	Agile, Kanban
Plan-driven, approval-based	*Governance*	Empirical, continuous, process-based
Long-term deals	*Sourcing*	Short-term deals
Good at conventional processes and projects	*Talent*	Good at new and uncertain projects
IT-centric, removed from customers	*Culture*	Business-centric, close to customer
Long (months)	*Cycle Times*	Short (days, weeks)
Security and stability	*Focus of service*	Innovation

Think marathoner

Source: Personal elaboration of Gartner (2015)

Two main guidelines direct IT department, and they come from two substantially opposite firms' business requirements. One guideline follows the business' need of guaranteeing a constant and reliable performance to the company and, as such, it is mostly interested in current daily business activities. On the contrary, the other guideline looks at the opposite need of innovating and spread digitalization throughout the company, to make it more flexible and faster in grabbing opportunities as they come. The dichotomy between exploitation and exploration is indeed here proposed again and seen under the light of the digital strategy. These two contradictory requirements generate a conflict not only in the IT function but also between the IT and

the whole company. IT departments are asked to find a way to satisfy and balance both needs without compromising the performance.
In Gartner analysts' opinion, this is the most important task CIO will have to accomplish in next years and, to this end, they suggest the implementation of the bimodal IT. Mode 1 must be deployed to satisfy the first guideline we explained, while Mode 2 for the second one. Note that the two modalities must cooperate and collaborate for the best of the company.

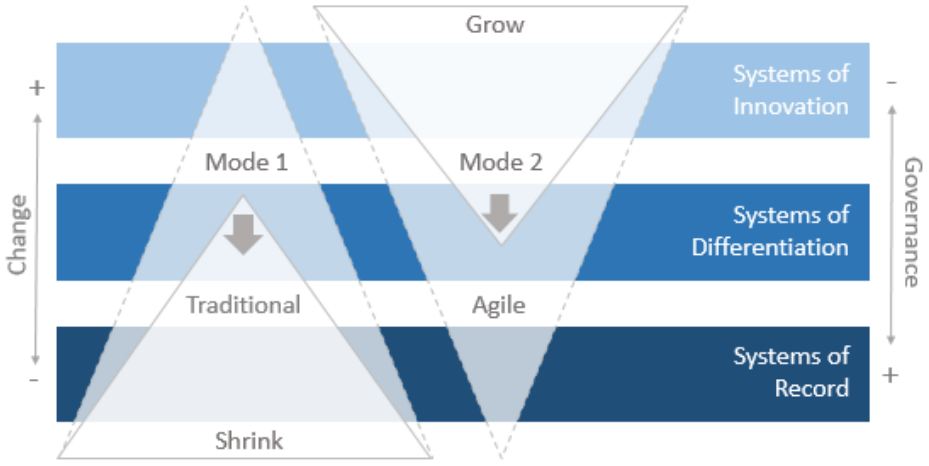
Gartner's analysts Mersaglio, Adams, and Mingway, in 2016 refreshed the concept of bimodal IT by defining it as "the practice of managing two separate but coherent styles of work: one focused on predictability; the other focused on exploration" outlining again the difference between the two modalities. One seeks to optimize well-established business procedures simultaneously by incrementally innovating legacy system. The other explores new solutions emerging from areas still unknown to the company. Both modalities are keys to create value for the company and face competition. The said authors introduced also the idea of 'enterprise bimodal capability'. As we recognize two opposite requirements and we implement two different responses to solve them, we are likely to create two different areas within the same company. One area is characterized by specific objectives and tasks, linked through a clear causal relationship, and the possibility of forecasting and planning. The other is characterized by uncertain goals which may change as new conditions arise, unclear causal relationship between actions and objectives to be achieved, and by the impossibility of forecasting future results a priori.

Each of the two areas have particular demands and needs in terms of human resources, values and culture, organizational structure, investments, performance appraisal systems, etc.. Companies promote, and consequently allocate a larger amount of resources to, the modality which is better matching the business priorities in a given period. As priorities change, so do resources. Anyway, proper communication and cooperative systems must be enforced between the two modalities so that the highest value is captured by the firm in its totality.

For the sough of clarity, Gartner analysts also offer specifications of what bimodal is not:

- Bimodal is not uniquely an IT capability. The bimodal process starts with a stronger focus on IT, however, in its final stage it should embrace the organization in its totality. Along this line, not only the IT capacities, structure, governance, processes change, but the ones of the whole company do. By adjusting planning, budgeting, and decision making mechanisms at the organizational level, companies will be able to leverage Mode 1 and Mode 2 for business advantage. As bimodal grows and expands, changes are not limited to the IT department.
- Bimodal is not synonymous with iterative application development. Iterative development consists in breaking down the software development of a large application into smaller pieces. The first bimodal IT-based projects are likely to expand iterative development skills. Nevertheless, Mode 2 initiatives may involve little or no software development. Further, iterative development is likely to be used also in Mode 1. Bimodal IT cannot be defined as and limited to a methodology for software development and delivery. It may start in that way, but it also include innovation management, adaptive sourcing, DevOps, lean, and other innovative techniques.
- Bimodal is not an operating model change. Bimodal goes beyond organizational structure, therefore its implementation does not merely coincide with centralized, federate, or decentralized governance mechanisms. For instance, the decentralization of some business units or functions does not automatically turn them into Mode 2 divisions. Similarly, centralized IT department does automatically correspond to Mode 1. Further, Mode 1 is not solely focused on current business as-it-is, since it also implies improvement and renovation, which in turn implies changes in methods, systems, and culture. It is possible for decentralized IT units to operate under Mode 1 circumstances and for centralized IT functions to work in a Mode 2 fashion. Bimodal is a style of work, not a structure.
- Bimodal is not the same as pace layering. Gartner's Pace Layered Application framework divides application systems into three layers on the basis of their innate rate of change.

Figure 22: Gartner's Pace Layering Model Maps to Bimodal



Source: Gartner (2015)

The layers are: (i) systems of innovation, which are experimental and are controlled in terms of time and budget to understand whether they could actually lead to value added; (ii) system of differentiation, which characterized by a certain level of uncertainty but their goal is well-clear, so that they are completely controlled long-term investments; (iii) systems of record, which are designed for stability and predictability and thus are subject to a low rate of change. Bimodal cannot be reduced to one single category nor it lies among its aims to create a framework of classification for the different activities. Pace layering and bimodal concepts can be applied together to better understands what the company want to do and which capabilities and resources are needed. Mode 2 is more adequate for the systems of innovation given that an exploratory approach is critical in this layer, whereas Mode 1 style of work is more appropriate for system of records. Systems of differentiation which do not imply significant changes will use Mode 1, while systems of differentiation that arise in response to new business demands require larger changes are better suited for Mode 2.

- Mode 2 is not shadow IT. Shadow IT refers to IT-related systems and solutions used inside companies without being specifically deployed or without being under the control of the internal IT department. Gartner analysts specify that Mode 2 is not to be intended as a formalized version of shadow IT. Bimodal involves a collaborative, open and transparent relationship between Mode 1 and Mode 2 and between the IT and the business. None of these traits typically, or mandatorily, apply to shadow IT. Opposite to shadow IT, bimodal provides an official and

recognized approach and set of capabilities to address business needs that are not easily solvable through traditional solution systems.

Mersaglio et al. (2016) argue that both the CIO and the company must have understood well the bimodal IT concept and its implication in order to begin the process for its implementation and conclude it successfully. Various case studies brought up by Gartner show that many CIOs started the process, even without having the resources for doing so. Nevertheless, Gartner analysts suggest that this approach is not wrong. In the fast environment that companies are facing nowadays, acting is better than standing. Bimodality for many aspects is not something to be mastered theoretically and then applied, most of the learning occurs through experience, by trying and making mistakes. Along these lines, an opportunistic tactical approach is fully welcome.

As said, CIOs are struggling to find a balance between two competing pressures – one for stable high-performing services, and one for innovative technologically intensive services. A large number of CIOs do not have clear in mind how to start the process for achieving bimodality nor how to grow bimodal capabilities. In the next section we will go deeper in the bimodal IT implementation phase.

3.3.2 Implementation of Bimodal IT

For many companies the starting point consists in undertaking a limited number of projects under Mode 2. This phase is named by Gartner ‘project bimodal’. It is better to approach Mode 2 through some carefully chosen projects rather than directly at the enterprise level. Criteria for selecting proper projects are:

- They should not demand large, or any, changes to the legacy system;
- They should be contained in scope and low risk (if the project fails, the impact on the business will not be large);
- They might already have a business partner willing to commit resources to the project and the project team;
- They should affect customer experience, better if exploiting both mobile and social technologies.

The listed criteria should ensure the selection of projects suitable for the gradual adaptation of the enterprise information management[4] systems to the bimodal IT characteristics. The initial projects should be opportunistic concrete projects which the Mode 2 team can coalesce around. Whether they are IT driven, business driven or vendor driven, Mode 2 initial projects should be subject to uncertainty, changes, and require a short-term delivery. Moreover, projects' outcomes will be focused on learning rather than on traditional ROI. The attention is centred on approaching the new style of work under safe and controlled conditions, trying on new processes and procedures, and getting feedbacks quickly. IT and business leaders will focus on the realization of each of the project which they are in charge for, without strict restrictions and tight controls. Indeed, companies, once identified one or more suitable projects, should not impose to project leaders the well-established structure and governance system. Rather, they should support the project team which acts on a sense and response basis, i.e. it acts by sensing the dynamics that arise from the market and dynamically responding to them. In the initial step of the journey toward bimodal, firms benefits from this project-based approach for three reasons. First, the value of the projects, and consequently of the bimodal methodology used for their success, can be demonstrated relatively quickly. Second, Mode 2 projects will provide the company with insights about how to redesign properly the enterprise information system in next steps. Third, effective cooperation between various organizational members, with different backgrounds and operating in different enterprise's realities, with a project-based rational created the basis for cooperation and collaboration at the company level.

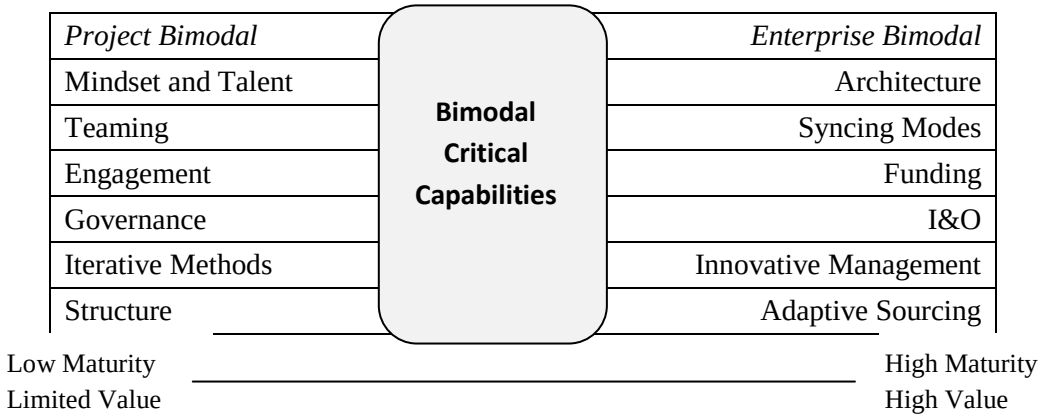
As a larger amount of projects are undertaken and more people engaged in them, the enterprise information management gets reshaped and extended, until the company reach a dynamic and flexible management information system, able to pass through and involve different organizational functions and divisions, which is the basis for a full bimodal organization. The target to achieve suggested by Gartner analysis the one of the enterprise bimodal, which is the most mature version of bimodal and encompasses not only the IT but all aspects of the enterprise. The enterprise based approach aims at the creation of large-in-scope entrepreneurial initiatives which embrace the organization in

[4] Enterprise Information Management consists in a particular field of interest within information technology, specialized in detecting systems for optimal use of information within organizations. Its aim is overcoming barriers in the information and knowledge management at the enterprise level.

its totality. This approach focuses on general business objectives and generally implies a long-term planning and commitment. The bimodal approach should be able to promote and be part of enterprise-level initiatives which are likely to be in need of both Mode 1 and Mode 2.

Reaching the bimodal enterprise stage engenders profound changes in the organization, especially in Mode 1 styles of work. As the first Mode 2 projects kick off and build, there will be an increasing level of interactions with the external environment but also and particularly with the existing internal context. The existing contexts will be required to adapt and the Mode 1 capabilities will evolve to be prepared for Mode 2 impacts on the company. In other words, at the beginning the focus is on building up a fully functional Mode 2 approach; once this is achieved, the focus moves on Mode 1 and its renovation. In the end the two modalities should be able to work one to the other and interact fruitfully to leverage their different strengths and capabilities.

Figure 23: Critical Bimodal Capabilities, from Project Bimodal to Enterprise Bimodal



Source: Personal Elbaoration of Gartner (2015)

At the beginning of the bimodal transformation, the main focus will be on the IT department. The CIO will have to delineate and offer new roles, new opportunities and new projects to the IT staff that have both an interest in and the potential for espousing Mode 2 work style. For the identification of the IT staff suitable for to Mode 2 mentality, an evaluation of the current IT organizational members through not only new filters of competences and expertise but also through attitudes, values, culture, and personal goals is required. Evaluation, in particular with new criteria, will cause anxiety. Consequently, the first step for a solid foundation of bimodal IT, and bimodal

enterprise, is the creation of an open and visible process for forming the Mode 2 staff culture.

3.3.2.1 Cultural Change

One of the main challenges identified by Gartner in the implementation of bimodality is, indeed, the cultural challenge. Bimodal initiatives fundamentally alter the approach to the execution and delivery of projects, and deeply impact the structure, capabilities, personality and culture of the IT environment. CIOs must keep in mind that any change to a work environment will cause anxiety in employees directly affected as well as in those observing the impacts. In consequence, CIOs must understand the personal and professional implications that bimodality brings to all IT members and look beyond the training that Mode 2 is likely to require at the beginning. The danger to avoid is that the development of Mode 2 capabilities and skills will become the sole focus of the bimodal initiative, whereas the role and requirements of Mode 1 be dismissed.
The CIO plays a critical role in handling the implementation of both Mode 1 and Mode 2 by defining them as distinct capabilities both critical to the organizational success. Most importantly, current IT environment must not be automatically labelled as Mode 1. Bimodal does not simply add another capability to the existing environment to promote agility and flexibility. On the contrary, it consists of two high-performing modes, and particularly agility may also come from Mode 1, for instance when it renovates core applications. Both Modes are needed for the company to be ready to step up.

Gartner analysts suggest three subcultures of the bimodal context that facilitate distinguishing between Mode 1 and Mode 2 for successfully coping with their differences:

- Operator subculture for Mode 1;
- Innovator subculture for Mode 2;
- Guardian subculture for the office of the CIO.

Operators are likely to keep themselves focused on delivering new solutions when requirements are well-understood, to maintain things running, and to prioritize stability over speed. Innovators, on the contrary, care less about efficiency, they like

experimentation, improvisation and are characterized by low risk aversion. Guardians keep the business safe and scalable, they have an eye on governance, risk, security, IT skills and members, and IT procurement, and finance.
Mingay and Mesaglio (2016) outline the fact that cultural barriers are perceived by CIOs as the biggest threat to bimodal model's success.

In other words, the most frightening danger thorough bimodal IT implementation consists in the potential relegation of Mode 1 that would have as a consequence the discouragement of a new generation of professionals from working in that area, whereas the reality is that all world organizations, from small to big ones, run on the Mode 1 mainframe which is of outmost importance for the business.
The cultural change has to be coupled with a change in governance and structure, since teams and individuals must be empowered to take decisions and action in a fast and autonomous way. CIOs have the role of supporters of the whole process.
The general approach toward needed modifications in the governance system should focus more on Mode 2 requirements, since this modality is the one that will likely demand for the largest alterations. Further, governance modification should be an empirical and on-going process, based on a sense and response logic rather than on planning and a priori forecasting. What as to be clear is the aim and direction of changes and the appraisal system for the final output.
Finally, Mode 1 and Mode 2 imply different risks and demand for different levels of investments. CIOs have to clarify to CFO how, when, and to which extent the company should invest in one or the other modality.

In sum, for bimodal to succeed in any firm CIOs must ensure that current IT members, and later the whole firm, fully understand that both Mode 1 and Mode 2 are critical to the company and both will evolve, develop, innovate. Team acceptance of and commitment to new practices is culturally driven. Along this line, bimodal lies its foundation also in a carefully managed cultural change. CIOs should clarify what Mode 1 and Mode 2 means, their differences and their distinctive characteristics and traits, while building a shared compelling vision that unite both. As stated by Mersaglio, Adams, and Mingway (2016) "managing cultural change begins with ensuring that all members of the IT organization feel confident that they not only have a future, but also that they are contributing to a growing, evolving and rewarding IT organization."

3.3.2.2 Alignment and Governance

Bimodal IT should allow companies reducing the gap between what IT provides and what the company needs. Thus, it directly relates to the core of the concept of strategic business-IT alignment as defined by Henderson and Venkatram (1993) and briefly described at the beginning of the chapter. In addition, bimodal IT requires alignment between Mode 1 and Mode 2, as stated in the previous section, and IS infrastructures, IT architectures, processes, methods, capacities and skills have to be integrated accordingly. Indeed, in establishing bimodal IT for the pursuit of digital transformation, companies should ask themselves how business-IT alignment is affected by adoption of bimodal.

Most often literature proposes IT leadership as the critical factor for the alignment of traditional and innovative IS infrastructures with organizational strategy and business demand.

Researchers have different views about how bimodal IT should be managed to capture the most of the business and strategic value from it. Some believe it is desirable to have a single CIO responsible for both Mode 1 IT and Mode 2 IT in order to minimize problems of communication, coordination troubles and delays (Andersson and Tuddenham, 2014). Others would prefer the leadership of Mode 1 IT and Mode 2 IT to be separated (Francois et al., 2014). Still others suggest the identification of even more specific and specialized roles, such as Business Relationship Manager or Chief Marketing Technologist, who constitute the connecting and coordinating tie between the IT organization and the business units and therefore allow the organization to achieve a stronger alignment (Kirschner and Kenney, 2014).

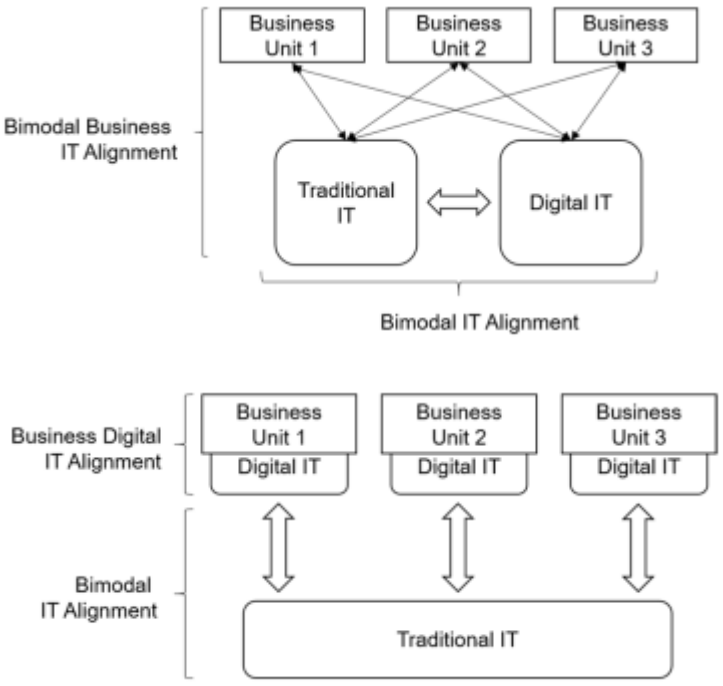
A part from the methodology chosen, in establishing bimodal IT governance, it must focus on flexibility and agility as well as on compliance and security. For both Mode 1 and Mode 2 styles of work there is a need of transparency, openness to new developments, resilience. This may involve different methods such as separate governance structure for each modality, special governance for cloud solutions common to both types, the introduction of lean decision processes, the creation of new roles etc..

Bimodal IT implies an extension of the well-known business-IT alignment mechanism. This is mainly due to two factors. First, the two modes need to aligned, not only from a

business point of view but also from an operation point of view – for instance, it is likely that the agile Mode 2 will still be in need of accessing data usually stored through mechanisms controlled by traditional Mode 1, consequently storing systems must be aligned as to be easily accessible by both modes and Mode 2 not to be obstacle or slowed down. Second, both modes have to be aligned with business and strategy so that they will actually bring benefits to the company (Horlach et al., 2015).

Alignment can be achieved in different ways with respect to the needs the company is facing. For instance, it might be the case that each unit requires a specific level of deployment of traditional Mode 1 IT and dynamic Mode 2 IT, so that the balance between the two modes is reached at the unit level; or it might be that, due to specific innovation needs, the organization requires a high deployment of Mode 2 IT targeted to each unit necessity, e.g. for specific projects, leaving the interaction with Mode 1 IT be internal to the IT itself.

Figure 24: Two Modes of Alignment Between Mode 1, Mode 2, and Business



Source: Horlach et al. (2015)

3.3.2.3Architecture

Horlach, Drews and Schirmer (2015) sustain that bimodal IT should be characterized by an organizational architecture able to take advantage of emerging tools and platform for

dynamic and agile customer-facing systems while simultaneously running the traditional well-defined, stable, and efficiency-focused systems. As a service cloud-based solution, this can be realized by virtualizing data and resources in a modular infrastructure usable by both Mode 1 and Mode 2 IT. Firms often deploy private clouds for traditional IT to ensure security and protect routine operations from risk, since the larger database is usually managed by Mode 1; whereas agile waterfall development is accelerated for the greatest benefit of Mode 2. Waterfall development consists in a non-iterative sequential design process used in software development. Its progress is conceived as regularly flowing downwards (like a waterfall) through its various phases of conception, initiation, analysis, design, construction, testing, production, implementation, and maintenance. Mode 2 pushed this model to a new creative level by mixing and recombining steps in order to follow innovative stimuli. In addition, external public or hybrid clouds can be used for digital IT in order to foster its independence. Horlach et al. (2015) suggest service-oriented architectures and data buses to be further approaches supporting bimodal integration at the architectural level. In a service-oriented architecture, services are defined as discrete units of functionalities which can be accessed remotely, used and updated independently. Moreover, they are enabled by technologies that are standards making it easier for the various functionalities to communicate and cooperate. As such, service-oriented architectures allow Mode 1 and Mode 2 to access large chunks of functionality, use them purely as they are or combine them in ad hoc manners. Service orientation promotes loose coupling. Data buses couple service-oriented architectures by providing the company with tools for facilitating the data transfer on a regular and on-demand basis.

3.3.2.3 Processes and Methods

Bimodal IT requires bimodality also in processes and operating models. A two-speeds IT management system may help firms in developing high-speed customer-facing capabilities while keeping untied legacy systems for which release cycles of new functionalities are slower (McKinsey, 2014). One solutions supported by McKinsey (2014) is blending methodologies, such as long-term waterfall development and continuous delivery, in order to pursue bimodality in processes. Nowadays, there is no time to apply multi-year IT development methodologies, nor it is wise to migrate all

delivery to agile methodologies. The solution is to apply in waterfall processes the agile development methodologies. This requires distinction between domains managed for fast iterative delivery and those for transaction integrity, as to serve effectively customer-experience, innovation, and back-end transactional systems. In this way, a two-speeds architecture is built: a customer-centric fast-speed front end running alongside a transaction-focused slow-speed legacy back end. The customer-facing part should be modular and flexible; on the opposite, the legacy part should be designed for high-quality data management, stability and scalability.

In the field of business intelligence, two-speed business intelligence methods have also been mentioned as a system to support operations in a bimodal fashion. While the traditional business intelligence team of the company continues to generate business intelligence practices based on security and existing core business, the agile mode of business intelligence is shaped to be iterative and to cope with unforeseen data discovery.

3.3.2.4 Don'ts

Gartner analysts identify some traps enterprises have to avoid in order not to make a mess out of bimodal IT application:

1 Trap: The timid middle. Timid middle consist in a too soft approach toward bimodality, which brings to neither Mode 1 nor Mode 2.

2 Trap: Lack of equity between teams. Mode 2 is not the only one interested by change and alterations. Both modes demands deep and assertive change for bimodal to work.

3 Trap: Disconnected Mode 1. Mode 1 and Mode 2 should be cooperative, transparent, aligned, and open one toward the other. When Mode 1 in completely disconnected to Mode 2, innovations are likely to never reach the customer and instead stop at the production phase or the two teams impeding each other.

4 Trap: Ballooning technical debt. Technical debt consists in the loose ends that result in the development process and need to be resolved. The challenge lies not only in going faster, but also in doing it sustainably. Addressing technical debt should guarantee that the software is well-written, well-architected, and

maintainable. The debt can come in many forms, such as documentation debt, design debt, unused and duplicated code.

5 Trap: Unrenovated core. A well-architected digital core is a long-term bimodal goal. Given that Mode 2's innovation cannot be successful if located in an inflexible legacy system, among Mode 1's main goals must be the one to create a renovated core providing capabilities required for a digital world and developing processes that facilitate the transition of those digital solutions into the production environment.

3.3.3 Negative Aspects and Critiques

Bimodal IT is surely not exempt from critiques. In particular, we can identify the following drawbacks:

- Bimodal IT creates a two-class system that increases complexity. The creation of two distinct groups within the organization – one tied to current legacy systems and existing policies and procedures, the other based on agile and flexible structures and processes, which have to be run at different speed – leads to a useless increase in organizational complexity, at a time when the company needs to push for agility. Further, technology silos make insights and data harder to access while hindering business and technology collaboration necessary to unlock value (McCarty and Leaver, 2016).
- Bimodal IT kills the culture. These two groups are also likely to compete for resources, skills, funding and business' attention. This might create internal competition and destroy common vision. Further, it may lead to an isolation of Mode 1 against Mode 2, and one of the two modalities may end up being perceived as useless to the business as compared to the others. The distinction is likely to be perceived more strongly internally, so that employees assigned to the 'useless' mode will feel demotivated and frustrated (McCarty and Leaver, 2016; Katz, 2015; Stöcker, 2015).
- Perpetuates the idea that back-end systems can be left as they are. Even if Mode 1 systems may be modified less frequently, it might be the case that when a change occur they have to align themselves really quickly. If companies want to quickly

cycle new ideas, it is likely that business will be in need of streamlining the operational processes and systems, organizational re-engineering will require the updating of back-end applications, and, overall, the company will have to modify the back office systems of record as frequently as the front office systems of innovation (Fowler, 2016). Gartner seems to suggest that, given clear difficulties in modifying traditional IT, IT management should move transformation efforts away from Mode 1 (Bloomberg, 2015). If the organizational members perceive Mode 1 been solely tied to current business and work styles, alterations might be hard to be applied.

- Bimodal IT is an oversimplifying model. In Gartner analysts' view, companies move from a one-size-fits-all model, where classic IT was thought to be the sole approach needed or on the opposite all effort was put on innovative systems, to a two-size-fit-all model. However, we are not living in a bi-sided world, reality most often appears to be multi-sided. To reflect reality and overcome the two silos and modes problem, a multi-faceted IT operating model might be needed (Bayley and Shacklady, 2015).
- Bimodal is seen as the solutions to digitalization problems. Gartner seems to conceive bimodal IT as the perfect solution to most of the problems recent years environment has brought to companies' attention, even suggesting to rush into the bimodal approach when not in possess of proper capabilities and resources yet. However, firms need to be prepared both for Mode 2 and for Mode 1: it is easy not to have the adequate skills for innovation as well as it is easy to find the organization unable to renew existing systems in the correct way. This will drive the business not only to a lack of innovation but also to a loss of competitiveness in core business.

It must be said that some of these drawbacks were already pointed out by Gartner as bimodal IT aspects to be handled carefully. For instance, the cultural dichotomy was outlined as the main challenge in the implementation of bimodal IT, so as the risks linked to a dual-class system and the belief of Mode 1 IT renewal to be unnecessary were indeed among the traps highlighted by the consulting company. Gartner analysts firmly specified that Mode 1 has not to be intended simply as 'business as usual'. Many people have also pointed out that bimodal model is not something totally new: the

dichotomy between innovation and existing business has always been a central focus not only in IT literature and management but also in the entire management and organizational literature. This can be thought as a translation of the trade off ambidexterity seeks to solve at the enterprise level, the tensions between 'exploration' and 'exploration' within the IT (Bloomberg, 2015). In treating this trade off, many scholars and managers agree that innovation often necessitates to be separated from the main body of the organization, technologically, culturally, sometimes even geographically, since it will be hard for employees to be really innovative if constrained by the established company's boundaries. However, this does not imply that traditional IT can be left as it is. For digital transformation to be successful, it must embrace both modalities and be end-to-end: with customers and innovation systems at one end and system of record at the other. CIOs, especially in well-established firms, may find difficult to implement changes on traditional IT, but it is not impossible. Further, IT should be in charge of compliance, security, and reliability for systems of records while at the same time these crucial priorities should not be separated from fast innovative organizational efforts. In this way the end-to-end circle could get completed.

3.3 Conclusions

We started this chapter with some brief references to the concepts of business-IT alignment and digital strategy. Indeed, in the ages of digital transformation, the traditional view of the business-IT alignment has to be modified and expanded in order to take the new digital modes of IT provision into consideration and to embrace the new implications brought by digital business strategy. Here we analyzed bimodal IT as one of the methods companies can use to establish and advance a digital IT unit and, later, a digital innovative business. In essence, bimodal IT extends traditional alignment view by requiring alignment between Mode 1 and Mode 2 and between the two modes and the business in a more agile manner.

The literature review revealed some critical research gaps. Although most of the researchers and analysts mention Gartner's definition, consensus as regards bimodal IT implementation approaches has not been reached yet. The formulation of concrete suggestions could also give greater clarity to the proper interaction to be promoted between Mode 1 and Mode 2 and with the overall organization in content and structure. Moreover, even though examined papers seek to maintain a neutral stance regarding bimodal IT, many times authors, opinion interference, whether implicit or explicit, is still perceptible. Critical voices sustain that bimodal IT is not sufficient for long term competitiveness, and they propose trimodal or multi-faceted approaches. Whether these approaches can actually result in better alignment within the IT and between the IT and the business has so far not been examined. In addition, research with academic background is scarce so far, bimodal IT being a novel approach, observations are likely to come in larger amount during next years.

4. Case study

As companies progressively rely on mobile, social media, cloud and big data in their business, the very nature of the IT function within firms switches from providing reliable and cost-effective technological support to proactively searching new ways for leveraging technology and creating customer value. Further, the today business environment's characteristics of uncertainty, high technological innovation rate, and changeable consumer preferences led management literature to investigate the concepts of dynamic capabilities and organizational ambidexterity.

In the previous chapters we discussed the well-established ambidexterity literature at the organizational level and the nascent bimodal literature at the IT-level, outlining that exists a lack of studies associating ambidexterity to IT management. A full concrete explanation of the dynamics and managerial practices that can be found applied by IT managers for the solution of ambidexterity tensions is still missing. For scholars and practitioners alike, the question then arises as to which structures, procedures, and systems organizations may implement to pursue and attain the goals of exploitation and exploration at the IT-level for the best of the entire business.

The aim of this study is the development of an analysis of the different aspects and factors that can be linked to ambidexterity managements at the IT function level. Consequently, we seek to understand which are the main ambidextrous dichotomies that IT departments are facing and the mechanisms, processes, and cultural values that can be adopted to resolve paradoxical tensions springing from said dichotomies.

4.1 Company Context

The research design consists in a qualitative case study of ambidexterity management within the IT function of a large Italian company in the field of luxury fashion. It is a public company traded in the Milan Stock Exchange MTA.

4.1.1 The Market

In the last two years the luxury market experienced a reduction in growth rate as reported in the Altagamma Monitor for the luxury goods market 2016. Indeed, the main driving forces of the luxury market weakened in last years: China went through a financial crisis which implied a reduction in purchases from Chinese customers, and the fear of terrorism in Europe lead to a decrease in the tourists flow which impacted luxury boutiques performances. In addition, it should not be underestimated the changes in customers attitudes and needs, millennials have proven to be characterized by different expectations as compared to previous generation under many instances and also when considering luxury. The general slowdown in growth rate, however, did not imply significant contraction in financial results. It rather seemed to imply an establishment of the overall market and brands which now are reinventing themselves toward today customers and for the maintenance of competitive advantage against the mentioned new market complexities, from products to logistics, from digital to customer relation management. The environment that luxury top players have to face now is more complex and demanding than in the past, it requires companies to review their business strategies in an innovative perspective while remaining faithful to their imagine, heritage, and exclusivity. Situations of moderate growth necessitate a careful evaluation and monitoring of investment strategies.

Another critical factor in the luxury market which gained special relevance in the luxury fashion industry during last decade is the distribution channel. This is evident when thinking at the massive diffusion of the retail channel for fashion brands in a market so far predominated by the wholesale channel. Indeed, luxury fashion brands are diverting the majority of their attention and resources toward retail and e-commerce in order to adapt and align themselves with the upcoming environment conditions.
Retail in 2016 reached the 36% of the market total value and, in terms of growth rate,

the retail channel is experiencing an expansion twice as big as the wholesale one. Retail is critical both because it allows companies to collect a more accurate level of data on their customers, and because it permits a thigh control over the brand experience. Shopping experience is not only a cost for clients in terms of time used, but it is valuable in terms of emotional experience. As such, the adventure customers have relating to the brand and the product pre- in- and after- purchase is critical for the actual sale. Luxury companies are not anymore speaking only of product marketing but of service marketing.

Further, although only the 7% of luxury sales occurred online, over the five next years online sales are expected to more than double. The diverse and varied digital experiences and the concrete and real in-store experiences should be more and more integrated and connected. The key of success is likely to lie in the correct balance between human factors and digital factors, between offline and online experiences, digital technology must be applied to retail and the overall communication strategy must be omni-channeling.

Omni-channeling consists in giving the possibility to costumers to come to contact with the brand in any way they prefer to, without making a clear distinction between what happens virtually and concretely. It is not simply e-commerce. The challenge is not in the creation of a cyber-retail but in deploying technologies as to create a stronger interaction with the client, in promoting distribution excellence toward a 360° customer-centric approach. If ten years ago the goal was to open as many stores as possible, now is to reach the client in as many ways as possible. Furthermore, modern clients are usually more prone to gain information through different channels in their purchasing process. As such, brands should be able to capitalize on the different information and channels that can be useful for the purchasing decision and dispose of them for competitive advantage. Retail and e-commerce help in obtaining ready-to-use data on customers' characteristics and targeting clients' experience.

In sum, the greatest threat to luxury fashion brands is omni-channeling that asks for tight collaboration between CRM, retail, and IT. The prospective seems to be clear, but projects are all to be accomplished.

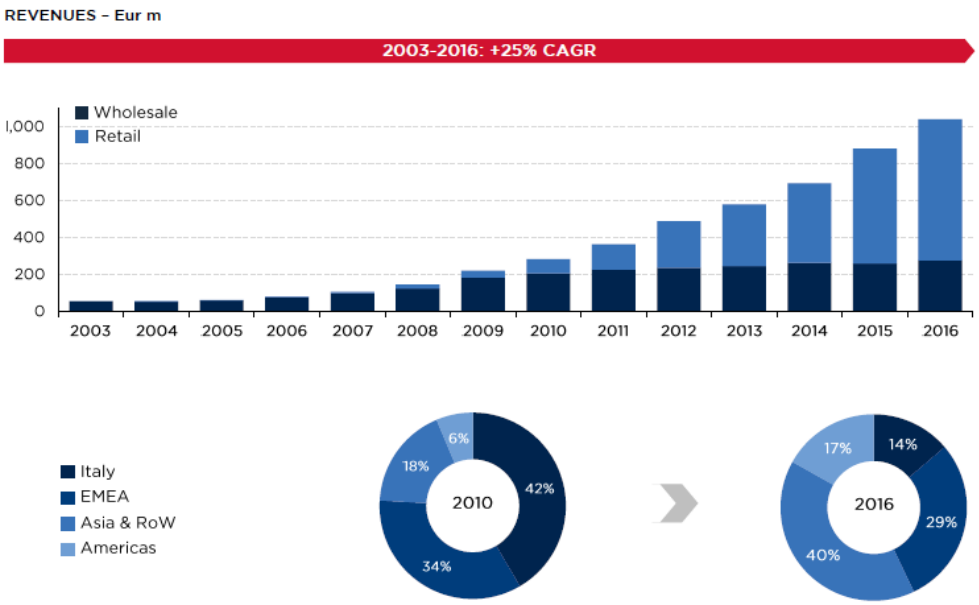
4.1.2 The Company

The Company was born in 1952 in France, its brand saw a revitalization of the brand starting from 2003, and in 2013 the Company was listed on the Italian Stock Exchange. Today it constitutes one of the leading companies in the luxury fashion industry with iconic outerwear products.

The Company operates in EMEA, APAC, Korea, Japan and the Americas where it already is in a position of dominance for the luxury outerwear market segment. Since Company brand success re-exploded in last two decades, the growth potential is still relevant, which is a characteristic that makes the Company different from the majority of luxury brands that, as said, experienced a consistent stagnation in last years.

The performance for last 5 years is particularly significant and clearly discloses the massive growth the Company is facing, characterized by a strong focus on the retail sales channel. In 2013 the Company could count on 107 mono-brand stores directly managed by the Company scattered throughout EMEA, APAC, Japan, and USA. In October 2017 the Company can rely on 193 directly managed stores scattered throughout EMA, APAC, Japan, USA, Canada, Brazil, Korea, and Australia. In only 4 years the retail turnover moved from €431 million in 2013 (57% of total revenues) to €764 millions in 2016 (74% of total revenues).

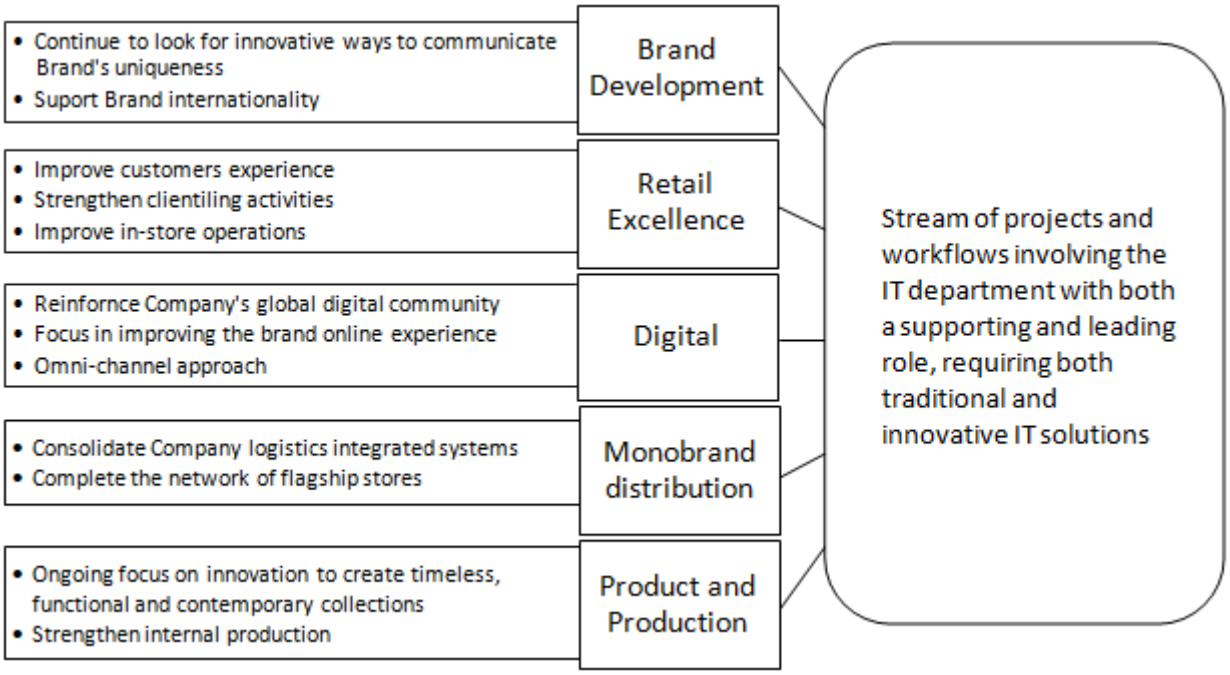
Figure 25: Company's Revenues Track Record



Surce: Company's 2016 Official Result Presentation

As previous data shows, the growth of the Company resulted to be consistent in spite of the market slowdown of the luxury goods sector. This is due to a strategy based not only on the excellence of the product but of the whole customer experience.
For the purposes of this paper, it is interesting to notice how this extremely costumer-centric approach gave birth to a series of projects focused on retail excellence and operational efficiency which all massively involve the Company IT personnel.

Figure 26: Pillars of Company's strategy



Source: Personal Elaboration of 2017 Company Overview

Before the 2000s the role of the IT function was relegated to providing technical support and cost efficiency to business maintenance. IT being a staff function and not a business function had a limited influence over the business demands it was asked to carry out.

During the first decade of 2000s the Company's organizational systems started to be re-examined and re-arranged to accommodate the increasing internal demand for IT-related projects. However, the degree of IT involvement and its decision-making authority was still limited.

During the course of the 2010s, the IT began to be asked for accomplishing projects initiated by the business and within the defined project scope it started to have considerable autonomy over technical choices related to its domain of expertise. Today, the IT is supposed to support the effective and simultaneous development of multiple initiatives on an ongoing basis, as such its importance in the whole process is augmenting. The extent to which the IT is involved in projects and the intensity of the communication between the business and IT varies based on the type of project. In instances when the technology is detained internally, IT is actively involved in all phases of project development and, more than that, IT is requested to complement business perspective and give advices bringing its technical expertise. Further, given that customer preferences are shifting towards mobile channels, digital purchase services are consequently expanding to meet the need for a more interactive communication and steady information availability, which almost always demands for IT interventions.

This renovated approach to customer-related operations got reflected in the way the Company operated internally in the spreading of the decision making authority throughout Company networks and in the digitalization of processes and operations. It was during the last years that a new organizational model was adopted in the IT department. The goal of this transformation is to strengthen Company's customer focus, products and services, while simplifying the structure and improving efficiency.

Within this strategic frame, digitalization will enable the transformation and make it possible to achieve a more intense and fruitful one-to-one relationship with the customers.

A strategic long-term project was officially launched in 2016 which principal initiatives work around:

- Client experience: strengthening client focus by further improving customer experience, engaging in more clienteling activities, improve in-store operations , design and refurbishment.
- Digital: improve brand online experience, reinforce Company's global digital community, implement an omni-channel approach.
- Operational efficiency: enhance Group's operational structure.

4.2 Research Setting

IT departments are particularly suitable for the study of ambidexterity since their activities involve both strategizing and strategy implementation. Moreover, the nature of ambidexterity in this contest remains highly unexplored to date.

Our understanding of the concept of ambidexterity implies that its management is strongly associated to the concept of paradox and that paradox management and ambidexterity should be viewed in combination. Ambidexterity capabilities are indeed closely related to the ability of resolving paradoxical conflicts. As we saw in previous chapters, ambidexterity asks senior leaders to support contradictory strategies simultaneously (Smith and Tushman, 2005), to resolve paradoxical tensions in order to accomplish disparate initiatives at the same time (Gibson and Birkinshaw, 2004), and to adopt paradox lens since the organizational success depends on exploiting and exploring simultaneously (Smith and Lewis, 2011). Not surprisingly, a central debate in ambidexterity literature is how to accommodate and integrate contrasting demands.

The management of the Company IT department was examined, taking this integrative perspective of an iterative paradox resolution process, in which organizations recurrently resolve paradoxical tensions and gradually achieve ambidexterity. The goal was to understand how opposite demands can be fruitfully handled in a context that experienced a dramatic increase in the IT involvement in strategy and business in the last decade.

As a basis for the following case theorizing, few theoretical assumptions should be introduced that can be deduced from the previous literature review. Discursive practices and actions of senior leaders – such as highlighting strategies and goals, defining responsibilities and level of authority, processes and procedure, and time objectives' time horizon – are assumed to have an influence on organizational capabilities (Smith and Tushman, 2005; Eisenhardt et al. 2010; Smith and Lewis, 2011). Moreover, leaders' cognitive and behavioural capacities can be employed to address contradictory demands and foster ambidexterity (Raisch et al., 2009). Finally, the IT management and leadership play a critical role in leveraging the use of IT, in shaping IT-business relationship, and in developing IT capabilities in dynamics environments (Jansen et al., 2009).

4.2.1 Data Collection

In summer and autumn 2017, we have conducted 8 personal in-depth semi-structured interviews with the members of the IT management team as well as the project managers.

Each interview lasted approximately 45 minutes and consisted of three parts:

- Implementation of ambidexterity within the IT department;
- Integration of the exploitation-exploration forces;
- Meaning of 'innovation' from the IT perspective.

For the first part, we asked a series of open-ended questions related to the organizational changes that the Company undertook within the IT department in past and recent years (e.g. How the IT function used to be structured in the past, how is it structured now and which are, if there are any, the planned moves for next year). The aim of this group of questions was to gather information about the differences in activities pursued by the IT department in different years, the differences in IT goals and main mission, and the changing role of IT in the Company strategy. We also investigate how exploitation and exploration initiatives were and are managed, whether different teams were and are in place focusing on exploitation or exploration, whether they alternate the activities sequentially or which other mechanisms are implemented.

Further, we asked for who is in charge of the integration and balancing between the two forces (e.g. Who does pursue exploitation activities? Who exploration ones? What are the IT-related decisions? Who is in charge of these decisions?). These questions were needed to obtain a picture of ambidexterity management within the IT. The interviewees were also invited to reflect on the different steps that were involved in the process of changing IT systems, procedures and methods.

For the last part, we predominantly focused on the definition of IT-innovation the interviewees were prone to provide us, guiding them in their answer in order to gain insights on the nature of IT innovative expectations (radical or incremental, bottom-up or top-down). All interviews were recorded and transcribed ad verbatim.

During the interviews we allow interviewees to speak spontaneously and fluently, guiding them toward the critical points in analysis but also permitting for divagations. This was done in order to gain all the possible insights around the main topic in analysis

and not to exclude to us the possibility to obtain unexpected perspectives. Acting differently might have lead to an imposition of the final results by forcing interviews contents instead of a realistic examination of what is currently in place in Company's IT department.

We reframe then the answers given by the interviewees in order to detect the various paradoxical tensions the IT members have to face and how they manage them, as we will explain in the next paragraphs.

Table 9: Sum up of Data Sources' Characteristics

Data	*Description*	
Interview	*Position/Role of interviewee*	*Responsibilities/Involvement in initiatives*
	Senior IT leader	Responsible for the overall IT strategy in alignment with business demands; responsible for making senior management decisions related to IT strategy, structure, resources, and other key program decisions.
	IT leader	Responsible for aiding senior managers and preparing decisions in the areas of IT strategy, structure, and resource; responsible for supervising initiatives, integrating projects and processes, delivering solutions.
	IT project leader	Responsible for managing projects/sub-projects, usually reporting to IT leaders.
	IT domain expert	Members with specialized expertise in a particular business domain or IT area.
Interview characteristics: semi-structured 45 minutes interviews divided in three parts: i) implementation of ambidexterity within the IT department; ii) integration of the exploitation-exploration forces; and iii) meaning of 'innovation' from the IT perspective.		

Source: Personal Elaboration

4.2.2 Data Analysis

Earlier in the paper, we saw that IT managers have to address multiple paradoxical tensions, for instance accommodating business and IT interests in achieving both operational short-term and innovation long-term goals. As the focus of this dissertation is to gain some deeper insight on the ambidexterity management in IT departments, this became the centrepiece of our analysis.

We define IT ambidexterity as the IT management capability to solve paradoxical conflicts associated to IT-related projects. Thought IT is gaining importance in all types of sectors and business, little is known on the nature of ambidextrous challenges involved in its management. Following the study by Gregory, Keil, Munterman, and Mähring (2015) we seek to identify six ambidexterity areas for IT and related responses.

Ambidextrous areas are:

- IT portfolio decisions: IT efficiency versus IT innovation.

  IT efficiency refers to IT focus on the reduction of operational costs and expenditures, while IT innovation refers to IT focus on the investment in innovations that could enable IT-based business opportunities. Here we can see a clash between short-term IT efficiency targets and long-term innovation needs, IT strategy needs to understand on which of the two to push more and when and direct investment consequently.
- IT platform design: IT standardization versus IT differentiation.

  IT standardization stresses a consistent and homogeneous use of IT systems, whereas IT differentiation stresses flexible adaption and customization of IT of business needs. The ambidextrous struggle springs from the need for combining a varied customer-facing front-end to a standard process-oriented back-end, and for the establishment of a front-to-back-end IT mindset.
- IT architecture: IT integration versus IT replacement.

  IT integration stands for reusing and integrating existing IT components, while IT replacement stands for for IT renewal leaving legacy systems behind. The conflict lies in balancing the proper degree of IT renewal to avoid abrupt replacement and foster temporal stability in IT integration.
- IT planning: IT agility vs IT stability.

  IT agility refers to the capacity of being responsive to strategic and contextual changes, whereas IT stability to ensure an overall stable foundation for execution. We need to remind that plans are likely to change over time harming stability, conflicts might be dammed by refining IT development roadmaps within given time intervals.

- IT governance: IT transversality vs IT autonomy.

  IT tansversality stresses out the need for ensuring alignment between IT projects' goals and solutions, while IT isolation posits that sufficient leeway should be given to projects to address autonomously different needs. Tensions emerge between autonomy and control, between what to integrate and what leave on its own.

- IT delivery: IT coordination versus IT isolation.

  IT coordination focuses on synchronizing IT releases, while IT autonomy seeks to enable IT projects to deliver separate components for release. IT needs to define a role balancing isolation and coordination, resource allocation, and prioritization.

Further Gregory et al. (2015) state that the IT ambidexterity areas of portfolio decisions, platform design, and architecture are mainly associated to IT strategizing and require the mutual accommodation and combination of IT and business interests. Whereas IT ambidexterity areas of planning, governance, and delivery are mainly associated to projects execution and implementation, and they require a dynamic balancing of different IT needs toward different business needs.

Note that we should not be misled by the list of opposite forces reported above. IT Ambidexterity from the management perspective is conceptualized here as a paradoxical choice and not a trade-off. A trade-off is a problem situation in which there are many possible solutions each striking a different balance between two conflicting pressure. In a trade-off there can be many different combinations between the two opposites, each with its own pros and cons, but none solution is inherently superior to the others. Differently, a paradox is a situation in which two seemingly contradictory, or even mutually exclusive factors, appear to be true at the same time. At best, the problem-solver can find a workable reconciliation to accommodate both factors.

Table 10: Ambidextrous Areas' Description

Ambidexterity area	*Dichotomy*	*Description*
Portfolio decision	Efficiency	– Constant pressure on IT to contribute to efficiency ratio; – Productivity as key IT benchmark; – Regular efficiency-based control of IT investments.
	Innovation	– IT acting as a strategic partner in identifying new IT-based business opportunities; – Change in technological environment triggering IT innovation.
Platform design	Standardization	– Design a standardized, simple, homogeneous IT platform; – Advocate a mind shift from developing to configuring.
	Differentiation	– Enable timely solutions to new business requirements; – Constantly adapt IT to emerging requirements.
Architecture	Integration	– Cross-boundary IT coordination and integration; – Realize synergies between IT processes and systems.
	Replacement	– Replace and transform existing enterprise IT; – Get rid of legacy systems.
Planning	Agility	– Adapt IT plans due to external influences; – Agility to respond to new requirements.
	Stability	– Reflect upon the degree of required and acceptable change; – Ensure IT projects stability.
Governance	Transversality	– Ensure a holistic view; – Align activities across interrelated IT projects.
	Autonomy	– Business units exerting pressure on IT projects to answer their local demand; – IT projects working in isolation.
Delivery	Coordination	– Ensure cross-project coordination of interdependent deliverables; – Monitor heterogeneity of IT projects deliverables.
	Isolation	– Ensure short-term delivery through autonomy; – Autonomous releases.

Source: Personal Elaboration of Gregory et al. (2015)

Interview analysis proceeded as follows. Interviews were examined to identify quotes related to the IT ambidexterity and classified on the basis of the IT ambidexterity areas explained above.

Furthermore, statements were grouped based on whether the interviewee described ambidextrous mechanisms manly related to structural factors or contextual factors or leader-based factors. For example, if interview stated that he or she can choose and

manage the IT responses to business demands without consulting other members of the IT team, that quote would be assigned to IT project isolation and autonomy.

Once we had classified interviewee-level instances, similar themes across the multiple informants were looked for. To understand which answer to the diverse and varied ambidextrous areas mostly characterize Company IT department we calculated the frequency and occurrence of quotes related to same themes and mapped them. As a result, 32 quotes were obtained from 8 interviewees that describe the ambidexterity mechanisms enforced by the Company IT members.

4.3 Research Findings

We classified the 32 quotes as follows:

Table 11: Quotes with respect to Ambidexterity Areas and Role of the Interviewee

		Position/Role of Interviewee				
Ambidexterity areas	*Answers*	Senior IT leader	IT manager	IT project manager	IT domain expert	Tot
Portfolio decisions	Efficiency	X	X		X	3
	Innovation	X		X		2
Platform design	Standardization	X			X	2
	Differentiation	X		X		2
Architecture	Integration	X	X	X	X	4
	Replacement	X				1
Planning	Agility	X				1
	Stability	X			X	2
Governance	Transversality	X	X	X		3
	Autonomy		X			1
Delivery	Coordination	X	X	X		3
	Isolation				X	1
Management	Structural	X				1
	Contextual	X	X	X		3
	Leadership-based	X	X		X	3
	Sequential					0

Source: Personal Elaboration

We would like to provide an analysis toward an excursus of some of the most meaningful quotes.

The interviewee that most emphasized changes in IT organization during years is the Company CIO. As said by the Company CIO:

> "The IT structure that was in place in our Company 6 years ago is what I define an 'old-style IT organization' which can be represented by a group of untied silos. The referent for each information system – each silos – was in charge of the entire development of the information system with respect to the Company needs, from demand detection, demand organization, solution organization, solution implementation and deployment."

This was an extremely vertical structure where no horizontal communication was in place. From the point of view of IT governance, to use the terminology previously introduced, this organization was characterized by a high level of isolation and autonomy in the sense that IT information systems taken individually were gravitating autonomously to address business specific needs. In this way the IT organization was driving toward solutions unable to communicate and processes that cannot be integrated. Execution did not take into account IT needs nor business' needs since isolated processes are not efficient and cost-effective in the long-run.
As the Company begun to expand and gain worldwide success, its governance arrangements were being re-analysed to accommodate a growing internal demand for technology-related projects. If 'old-style' governance approach was mainly tailored at facing episodic projects related to IT, on the opposite the new approach should allow the IT to support the effective and continuous development of multiple digital initiatives on an ongoing basis. More than that, these digital initiatives should be able to communicate and be integrated. It came evident the necessity to shift the IT governance from isolation to transversality and foster integration at the IT architecture level.

> "In order to face the requirements of a Company that saw its success growing rapidly and dramatically in few years, it is mandatory to transversally organize IT solutions to respond to business demands that simultaneously emerge from the most different Company areas. Systems must react cohesively and processes must be integrated horizontally. We changed the structure to a matrix, in which a side is composed by service managers in charge of collecting and managing the business demand and the

other side by information systems divided in competency centres. For each problem there is one solution architect so that to an organized demand can follow an organized and integrated answer." Company CIO said.

It is not only crucial that proper solutions that meets individual projects' specifications are developed and provided, but it is also critical that the single solutions fits together. This implies a balance between projects' interests and cross-project control. Despite each of the interviewees recognized the importance and criticality of transversality and integration in IT projects, the conflict with autonomy desire does not come without notice. IT project leaders and IT leaders are those that negotiate compromises to both achieve transversality and autonomy.

"To me, it is a continuous balancing between moderating and prescribing integration. If you focus exclusively on the latter, the risk is to lose commitment on individual projects. If you focus only on the former, the risk is to being unable of making solutions to work together or to have to disparate systems. We need to make sure certain things are standardized and we will need some level of central control for that." IT Service Manager

"We must maintain an appropriate balance between the legitimate interests of the overall IT department and the business, and the interests of the single projects." IT Project Manager

Company IT department admits bimodal structure by applying a traditional IT approach with respect to consolidated processes and an agile approach for projects generally correlated to customer experience. In this sense, balance from stability and agility within execution is obtained following specific projects needs, constantly reflecting upon the degree of IT technologies and information systems required and acceptable change. Methodologies used can be deduced from our literature analysis and are executed relatively easily. Whether to apply one or the other approach also depends on the type of technology the project requires and if it can be developed internally or it has to be acquired externally to the company. Along these lines, the IT platform design will depend on the Company area in analysis. Costumer-facing front-end are likely to require higher level of differentiation in IT solutions provided, while back-end processes seek for standardization and consistent use of technologies.

> "As a luxury fashion company we seek to distinguish ourselves in the one-to-one relationship with the customers, in the brand experience we provide to clients, in the services we can deliver to and through our stores. This is where our innovative effort is principally directed. In parallel, there is a whole set of other areas that need traditional or incremental solutions, for instance distribution and logistics." CIO said.

When asking for how to manage two different organizational speeds and two opposite business demands especially with respect to the challenges posit to the IT staff members, the Company IT Retail Service Manager gives his personal view:

> "The differences in skills and attitudes between the various professional figures do not necessarily derive from the activities they are in charge of but from the relationship they have with the business. In activities in which it is possible to know all the business requirements ex ante and thus it is possible to plan and define all the procedures and processes, the worker could apply a traditional approach toward supplying an IT-related solution. In activities were on the opposite requirements are not fully known from the beginning, workers will have to adopt a more agile attitude toward the solution."

Interesting is also the CIO's point of view:

> "IT solutions are shaped with respect what the clients require, what the business requires, and what can be actually done with accessible resources. In this historical moment, due to the huge amount of technologies we can rely on, being in the IT can be resembled to being a child in front of a huge amount of Lego bricks scattered on the floor: there are many possible workable combinations, put you have to pick up the one that best fit the Company, regardless whether innovative or traditional. A good solution is a good solution, then we attach to it the word 'traditional' or 'innovative'. Consequently, those in charge of managing business demand and guide solution implementation will move from being traditional to being innovative according to emergent needs."

He also add some considerations about the difficulties of planning in a highly changing market as the luxury fashion retail due to the constant change in customers and service

typologies to be provided. Along these lines, stability and agility in IT systems must always be carefully monitored.

> "Due to rapid technological changes and due to sudden development in the fashion industry, having a detailed strategy is difficult if not risky. What I prefer to emphasize is the mission and the leading spirit of our department".

These three last quotes all together can be reconnected to an ambidexterity management based more on leadership and contextual/individual factors more than on structural factors. Indeed, even if different people get to work together with respect to the needs and peculiarities of the project, this does not imply any subdivision within the IT between members only focused on innovative activities and members only focused on productivity. Potentially, innovation might be required to any of the IT members if a project requires their collaboration. Thus, the entire business unit staff should have behavioural capacities to simultaneously demonstrate alignment and adaptability, being able to identify and maintain coherence among all patterns of activities within the IT department, while reconfiguring own activities to rapidly meet the changing demands of the business. This is reinforced by the answers the CIO and IT Competency Center Manager gave us when asked how the two opposite forces are now integrated.

> "Everyone in the IT knows there are two jobs to do: keep the Company running worldwide 24hours a day, and make the Company to evolve." CIO stated.

> "Sometimes we are required to reorganize our systems in order to reduce cost and speed-up processes and workflows, sometimes we are required to collaborate to the improvements of already-existing systems – usually in these cases an incremental approach is applied –, sometimes finally we are required to shape new processes, to reinvent Company way of working. But the people involved are always the same. We do not rely on a different pool of people with respect of whether we are facing one or the other of the three mentioned cases. Being innovative can be though for someone, this is where the role of the project leader is needed the most." IT Competency Center Manager argued.

Even the IT Competency Center Expert, tendentially emphasizing productivity and south for efficiency throughout the interview, underlies a change in perspective for what concern business view of IT contributions and IT involvement:

> "The extent to which IT is involved and the intensity of the communication with internal business clients change depending on the type of business demand. However, in last years IT was often involved in all stages of a project development and asked to complement business perspective by bringing in technical expertise."

The Project Manager stresses out even more the importance acquired by IT with respect to business but it gives a look to innovation, whether radical or incremental:

> "Collecting the demand means collecting the requirements of the business. However, it would be misleading to consider the 'business' as something clearly separated from the IT. Requirements come also from the IT and then a fruitful dialogue between all the departments involved is activated. Nowadays 'business' comprehends all the functions, without distinctions. The critical role that IT has with respect to the demand is not anymore the one of supporter, but the one of adviser. IT somehow is the biggest tool the Company has to enable business opportunities".

Another point that emerges from the analysis of the Company IT organization is the fact that no clear division exists between the roles of who is in charge of organizing the demand and who is in charge of developing the answer. Indeed, these two activities can be even performed by the same person. Demands are usually recollected and organized by the IT leaders. Then they strongly collaborate with IT projects managers to deeply examine the demand and envision the solution. Strong collaboration keeps on until the solution is delivered and fully running.

Along these lines, IT managers are then the ones that closely oversee and collaborate with the project managers to see how demands developments can be integrated with one another and implemented harmoniously. As last years market context evolution spurred the number of IT-related projects, the IT portfolio of decisions moved from being focused only on the most cost-effective solutions to improve innovatively the current and future business performance. In doing this, it is necessary for the IT leaders to

gather and collect information related to each of the various technology-related projects in the Company and examine projects' implications and content as an aggregate whole. Taking a holistic prospective allows IT leaders to identify synergies between different projects, rank them in order of their relative importance and streamline execution in the most effective way. Delivery of IT-related solutions is thus coordinated and alignment between projects is ensured.

> "We strongly collaborate with project mangers on an ongoing basis to ensure alignment between projects and alignment between the different usages of the competency centers the different projects needs. This add complexities to job roles since a there is only a blurred border, if any, between demand organization, demand implementation, and demand execution, but at the same time this allows us for a greater integration, a comprehensive vision, and foster long-term perspective." IT Retail Service Manager said.

The proper performing of all the activities above requires not only IT skills, but business skills. As it is becoming more and more evident, IT leaders cannot anymore be characterized by a totally IT approach, they must have and develop strong business and managerial competences in order to cope with the companies' new expectations. More than that, IT leaders and IT project manager many times have the role of arbitrator since they mediate the relationship between IT and business. However, IT members are still not involved in demand selection.

> "As for what included in the projects portfolio, we are not involved in it. Our role is to answer to the demand raised by the business. These demands come with a series of requirements and we evaluate all the tools in our hands to understand what could be the best solution from an efficient and effective point of view, whether the needed technology is already in our hands or in the one of our collaborators, and the extent to which some changes in processes and systems is needed. " IT Retail Service Manager

In spite of that, the Company CIO emphasized this last concept:

> "When speaking of the vision that should characterized IT in a challenging multinational Company, I always suggest a state of mind 'Be agents of

change and be agents of the business'. We are the first ones that should realize we have to participate in an active and proactive manner to solutions."

4.3.1 Discussion

IT is an important contributor to and grantor of operational efficiency. In the examined case, the pressure on IT contributions to the short-term Company's performance is outlined by the focus on stability, standardization and control for projects integration. However this is mitigated by the contextual factors that push for ambidexterity and a holistic approach to IT also at the individual IT member level. Moreover, the idea of innovation it is promoted at the functional level is the one embracing both incremental improvements and radical changes within the innovative scope of solutions. Along these lines, also the "traditional" solutions, when requiring changes in systems and processes, will be perceived as innovative efforts.

In the ambidexterity area of IT portfolio decisions, this implies that incrementally innovative projects are perceived as IT investments opportunities that simultaneously foster efficiency, lie down deeper foundation for IT innovation and create new IT-related business opportunities. With respect to IT platform design, it leads to carefully managed synergies in the varied IT information systems modifications and, connected to IT architecture, to the integration of the different solutions.

Solving the conflicts for ongoing achievement of IT efficiency and IT innovation require the mutual accommodation and merging of business and IT interests. Consequently, IT managers should be able to promote integrative and blended solutions able to convince the business that a combination of both demands can be achieved, without necessarily sacrificing one for the accomplishment of the other.

Along these lines, the analysis of the three strategizing areas for managing IT ambidexterity highlight a critical characteristic for IT leaders today: for IT managers to solve paradoxical tensions an IT-business partnering approach is paramount. Indeed, our findings suggest that to resolves paradoxical conflicts, including but not limited to IT efficiency vs IT innovation, IT standardization vs IT differentiation, and IT integration vs IT replacement, is deeply connected to the need for reciprocal

conciliation of business and IT interests. As such the case analysis goes to enlarge the prior business-IT alignment literature and priori researches emphasizing the importance of the partnering of the IT and the business to enable innovation and fruitful use of technology.

Dealing with paradoxical tensions in the three interrelated ambidextrous areas for strategizing and balancing their fighting demands over time is critical to ensure short-term progress and long-term transformation. Furthermore, the peculiarities of the ambidextrous conflicts at the strategizing level get reflected at the execution level.

In the interviews particular evidence can be found of the interacting pattern between IT plan and execution: it asks for an ongoing and recurrent activity of balancing between local operational needs and systemic strategic needs. IT project managers typically work under the mindset umbrella of leading an autonomous, temporary group of people focused on systems development to cope with the needs of a specific business area. This is due to the fact that generally projects are perceived to be temporary, but also to the fact that many times projects brings uncertainty. Thus project leaders and teams risk to focus on short-term achievements to increase the perception of success.

This might lead to uncoordinated IT approaches to solutions. However, in the Company IT people in charge of the development of the solutions are also those that then, at least at the beginning of the implementation, will monitor the successful execution of the defined solution. As such, they automatically perceive each project to have a longer life than the duration of the mere solution definition. Also, the strong collaboration of IT leaders with IT project leaders emphasizes a holistic and integrative perspective across all projects.

Fighting the tendency toward too high level of autonomy and isolation requires a delicate balance management. In the ambidexterity area of IT governance, IT leaders engage in cross-project control and high level of coordination with IT project leaders. Also solutions delivery requires an integrative approach for releases timing.

Unfortunately, no clear insights can be gathered around the bimodal model. Indeed, even is it is undeniable that IT leaders at different hierarchical levels are managing two modes for IT work-style, it is also true that no real separation between two modalities is performed. IT personnel gets grouped not with respect to their personal attitudes and

skills related to one or the other modality, but with respect to the IT-related requirements of the business and of the projects. Even if ambidexterity and IT bimodality are strongly interlinked concept, further clarifications and considerations should be provided on the latter.

In the table below we provide a sum up of the conclusions we derived above.

Table 12: Case analysis - Paradox Resolution Mechanisms

Domain	*Ambidexterity area*	*Paradox resolution*	*Critical points*
Strategizing areas for managing IT ambidexterity	Portfolio decisions: efficiency vs innovation	– Context – Embracing vision	– Balancing short-term and long-term business and IT requirements – IT-business partnering – IT-enabled changes
	Platform design: standardization vs differentiation	– Flexible recombination of IT components according to business needs	
	Architecture: integration vs replacement	– Cross-projects synergies for consistent IT use	
Execution areas for managing IT ambidexterity	Planning: agility vs stability	– Incremental innovation	– Balancing short-term and long-term projects requirements – Balancing between needs of single projects – Dealing with IT complexities
	Governance: transversality vs autonomy	– Cross-projects control – Collaboration of IT leaders and IT project managers	
	Delivery: coordination vs isolation	– Cross-projects IT delivery management for coordinating releases	

Structural ambidexterity	Grouping with respect to projects
Contextual ambidexterity	Embracing mission and vision
Leadership-based ambidexterity	Relevant leaders role
Sequential ambidexterity	No evidence

Source: Personal Elaboration

4.3.2 Limitations and Future Research

This research has found some restraints in the limited time available for the study which avoided us from making further and deeper analysis and in particular did not allow for longitudinal considerations.

Further, we took into examine only one Company, which ruled out the possibility of expanding our conclusions to multiple different contexts that surely would have yielded to additional insights.

Then the last limitation of our research lies in the fact that our inquiries on ambidextrous areas was confined to paradoxes of only two contrasting demands. We did not take into account the existence of far more complex situations in which the exploration-exploitation struggle gets represented through multiple conflicting forces.

An important direction for future research is the examination in greater details of the ambidextrous skills and abilities necessary for IT leaders. A more systematic approach to management strategies for IT paradox resolution is needed. Gaining better insights on the individual and group level factors useful to paradox and ambidexterity management may provide an important basis for a greater understanding of how the IT can and is capable to face the challenges that come from today business factors and environmental conditions. Ideally, IT ambidexterity examination would be performed longitudinally and would rely on a combination of interviews and ethnographic observations. Management tactics and organizing principles for IT leaders could be an interesting topic for future research.

Additionally, the consequences of technological developments and business changes and the interlinks between these two factors could be analysed in a paradoxical perspective. Indeed, our study also mentioned the challenge of IT-business strategic alignment. Literature so far mainly stressed out the importance of strategic planning and structural arrangements to achieve alignment. Our study suggest that the pursuit of wide-ranging and long-term IT involvement in business might help in overcoming alignment difficulties and foster the optimal exploitation of IT resources for business benefits.

Finally, avenue for future research might be to investigate the nature of paradoxes and ambidexterity in other companies' department so as to couple ambidexterity literature at

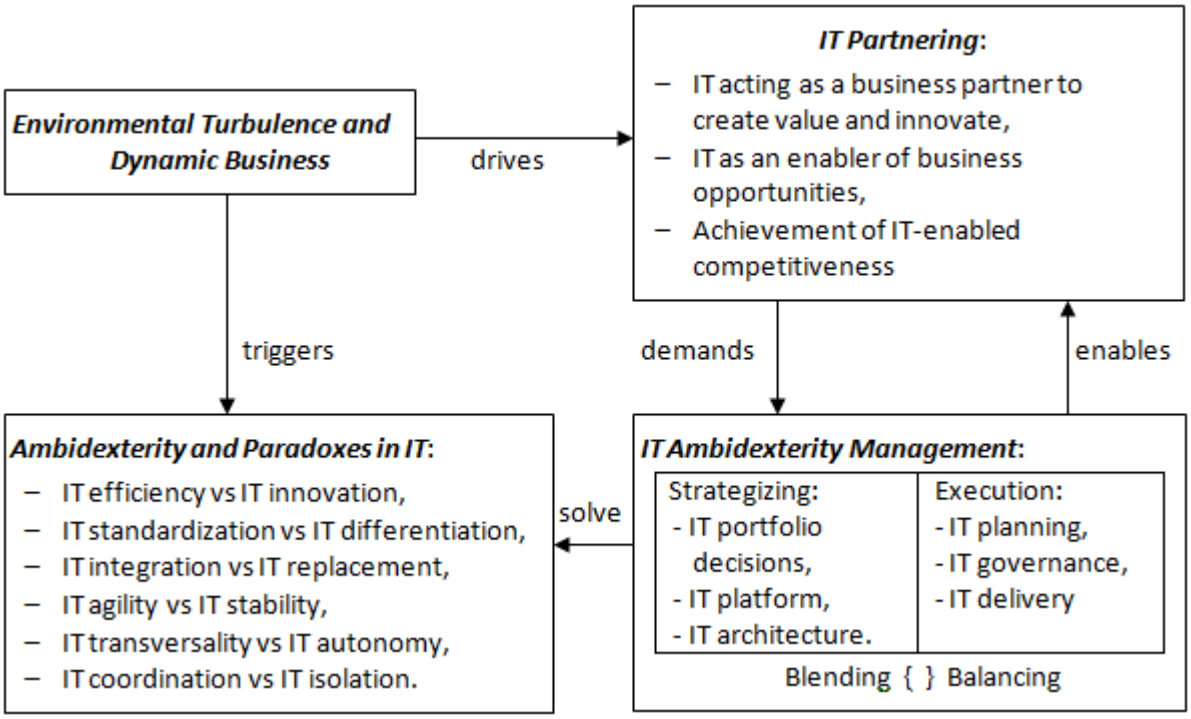
the macro organizational level with that at the micro organizational area level. Further, it might be interesting to check whether some or all of the paradoxes identified and analysed in this paper might be effectively transferred to other contexts and useful for the explanation of ambidextrous paradoxes with respect to the IT, business, or both. It can also be expected that some researches will be directed toward providing insights over the conditions and reasons that make blending and balancing mechanisms necessary across different context.

4.4 Conclusions

In this chapter we sought correspondence between the literature provided in the previous chapter and a real case analysis. We developed an analysis adopting the paradox view over the ambidextrous conflicts and in our analysis we followed the main points raised by Gregory et al. (2015) in their study on ambidexterity in IT programs.

Managing IT in the current business and environment context can be extremely challenging: it requires organizational members to develop ambidextrous capabilities to address conflicting demands and resolve paradoxical tensions across multiple areas. Further, it requires careful monitoring of business interests that might pose additional challenges to ambidexterity ones. For IT leaders, finding the appropriate management solutions to achieve ambidexterity is a dynamic process that asks for a concerted effort on the behalf of both the business and IT. Resolving paradoxes and exercising ambidextrous leadership plays a paramount role in accomplishing IT-enabled competitiveness in digitalized and dynamic environments.

Figure 27: Abstract Schema of IT Ambidexterity Management



Source: Personal Elaboration from Gregory et al. (2015)

Conclusion

The objective that we initially imposed on our research was the development of an analysis of ambidexterity management features with a stronger focus in the IT department. We investigated whether some ambidextrous paradoxes emerge in the management of the IT and which and then we sought to detect the resolutions IT leaders found in practice.

After a large review over the economic and management literature aimed at the description of concepts linked to dynamic capabilities, ambidexterity and IT bimodality, we presented an examination of the challenged faced and solutions implemented as disclosed by various member of the IT department of a French-Italian luxury fashion company. We gathered a series of interviews which were systematically recorded and then analyzed in order to better understand which techniques might be applied to reduce and smooth IT-related ambidextrous conflicts. We tried to check out some hypotheses and to put ourselves in line with the previous researches obtained in this field of study.

Our findings seem to suggest that the role of IT has expanded beyond the one of a technological infrastructure provider to the one of a strategy partner. Further, ambidextrous conflicts have been detected at all IT levels. Even though each of interviewees touch ambidextrous areas emphasizing slightly different aspects, it is evident that ambidexterity from the organizational macro-level gets reflected to the functional micro-level. Consequently, IT has to face conflicts not only internally to its departments but also externally at the business level and cope with all these tensions simultaneously. In order to harness the full power of IT against mentioned challenges companies need to make their IT departments more business-aware, promote lateral communications and cross-functional integration. At the same time, IT leaders must facilitate similar mechanisms at the IT-level by promoting cross-projects coordination and synergies. More than that, IT senior leaders should control the various IT developments while leaving enough autonomy for innovation to happen.
In our case study, this balance is mostly left to leadership-based and contextual mechanisms for ambidexterity.

Further, we associated the ambidexterity theme to the theme of bimodal IT.

Despite not having detected particular relevance of bimodal IT in our case study, we believe bimodal IT to be correlated with other influencing topic in the Information Technology world emerged recently. These topics can be all grouped under the umbrella of the need for IT management techniques able to deal with a changing environment, both with respect to internal business and external environment dynamics, while maintaining a strong adherence to the day-to-day activities.

Nowadays there is a growing expectation for IT to become a central element of the governance system that has a consolidated and holistic view on all digital initiatives within the organization and also promotes the development of shared solutions across different areas. In order to boost firm performance, IT should be put in position of relevance to effectively promote synergy and reuse of processes and technologies cross-functionally. We envision a situation in which IT is seen as part of an agile business team, and not as a referent person.

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