



UNIVERSIDAD DE DEUSTO - DEUSTO BUSINESS SCHOOL

**THE INTERPLAY BETWEEN EXPLORATIVE AND
EXPLOITATIVE ACTIVITIES WITHIN
AMBIDEXTROUS ORGANIZATIONS**

THE CASE OF HIGH RELIABILITY ORGANIZATIONS

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“It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things. For the reformer has enemies in all those who profit by the old order, and only lukewarm defenders in all those who would profit by the new order, this lukewarmness arising partly from fear of their adversaries, who have the laws in their favour; and partly from the incredulity of mankind, who do not truly believe in anything new until they have had actual experience of it”

(Machiavelli, 1532)

Acknowledgements

Machiavelli's statement, written almost 500 years ago, sums up neatly what I also discovered in my research. He had found that innovations are not embraced by the people whose traditional order is disrupted by innovation. However, he also recognized that people start to believe in something once they have actual experience with it, and that certain players influence the different orders with their power.

The dissertation in your hand follows the insights of Machiavelli. It is, above all, the product of hard work over the last five years. After having finished my Master's degree as a father of two children, I had to promise my wife Simone when I seriously began considering a PhD, to work on it whenever I could, but never at home while the children were awake. I can announce that I wrote this PhD essentially on my 3-hour commute to work, while others read newspapers. However, on about half the days I set my alarm clock to go off at about 04.00 a.m., in order to have some extra hours for working on the thesis. Next to that, the first two years were given over to lots of reading, which proved to be the single best lullaby when reading out loud in front of our baby's crib. Another insight I gained was that the topic I chose was indeed my topic. As such, it might be boring for others, but it kept me fascinated from about two years before my PhD program started and it continues to do so now, as I tasted blood and am keen to discover more and apply my new knowledge right away.

Over the last years, most of our family vacations took place very close to my university, and, to be very honest, I could not have made it without getting significant freedom during my after-work hours from my wife Simone. So my deepest thank goes to her, for all her support and the sponsorship she gave me over the last years, and especially over the last year when the actual writing happened. Second, I would like to thank my thesis director Nekane Aramburu who knew how to assist me with to-the-point feedback on my results and a very warm endorsement whenever it was needed during these intense years. Her competence and adamant sense of purpose was priceless for what I could learn from her. Third, a special thanks goes to Swiss and skyguide, the two companies that participated in my extensive case studies and gave me access to relevant data, and to Harmonie Sauer who acted as a kind of a tutor in Switzerland and a source for instant feedback whenever I was in doubt or had a pressing question.

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Zurich, March 2017

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List of Abbreviations

ACC	Area Control Centre
A.M.	Ante meridiem
ANSP	Air Navigation Service Provider
ATCO	Air Traffic Controller
ATM	Air Traffic Management
BFE	Buyer Furnished Equipment
CCO	Chief Commercial Officer
CFO	Chief Financial Officer
CEO	Chief Executive Officer
CHIPS	Swiss Implementation Program for SESAR related activities
COO	Chief Operations Officer
DC	Douglas Commercial
Dr	Doctor
EASA	European Aviation Safety Agency
EB	Executive Board
EBCO	Executive Board Committee Operations
Fam	Family
FOCA	Federal Office of Civil Aviation
HRM	Human Resource Management
HRO	High Reliability Organization
ICAO	International Civil Aviation Organization
ID	Identification
IT	Information Technology
Ltd	Limited
NDA	Non Disclosure Agreement
OA	Organizational Ambidexterity
OEM	Original Equipment Manufacturer
OK	Oll korrekt
ORE	Operational Risk Evaluation
ORA	Operational Risk Assessment
OTM	Organizational Transformation Model
PhD	Doctor of Philosophy

PLC	Product Life Cycle
Prop	Proposition
R&D	Research & Development
SESAR	Single European Sky ATM Research Programme
SIM	Simulator
UMB+	Unit Management Board (plus)
VC	Virtual Centre
VCM	Virtual Centre Model
VP	Vice President
ZH	Zurich
ZHAW	Zürcher Hochschule für angewandte Wissenschaften
3D	Three Dimensional

Abstract

The main objective of this research was to examine how and why key players support or hinder the implementation of a technological innovation and what influence the interaction between explorative and exploitative key players has in the context of High Reliability Organizations (HROs).

To cover these objectives, qualitative in-depth research in the form of a case study was conducted at two companies belonging to the aviation industry in order to investigate interrelated causal links and interactions that would have been too complex to be analyzed with a quantitative approach. To obtain reliable results, method triangulation was applied in the form of interviews, focus groups, and some direct observation and gathering of artifacts. Data triangulation was also used based on evidence from innovation-related internal documents, transcribed statements and discussions, and third party articles.

The empirical results showed that there are certain key players and different forms of interactions that support or hinder the implementation of technological innovation. The supporting key players identified here are: knowledge sharing exploitative players, innovation supporting informal leaders, and the so-called side changers, that is, key players who were once located on the exploitative or explorative side and later changed sides when taking over new functions. Key players with a strongly inhibitory impact are: innovation opposing informal leaders, non-cooperative exploitative players, and fanatic explorative players. With regard to formal and informal interactions, it was verified that informal interactions have a tremendous influence, both at the top and bottom of the hierarchy, on the successful implementation of an innovation.

The main conclusions and implications drawn from the research are that the election of the program leader for the implementation of an innovation as well as the election and involvement of other key players are crucial. Formal and, especially, informal channels should also be managed as closely as possible in such undertaking. Interaction processes between exploitative and explorative players should be iteratively intensified and managed closely, and trust should be considered a source of traction when implementing an innovation. Therefore, the successful implementation of an innovation depends on several parameters within the broader organizational context, but most notably on strong leadership, deliberate listening to and

engagement with the exploitative players, the management of informal channels, and transparency in communication.

1. INTRODUCTION

1.1. Problem statement

In a snapshot, the essence of this research can be summarized as follows: Companies need to balance exploitation and exploration in order to ensure their long-term survival (Raisch, 2008). An organization has to create new innovations or adopt innovations to constantly deliver attractive products on one side, while also adjusting and improving current products and processes on the other side. Innovation is an imperative for the long-term survival of any company in the open market in a globalized world. A problem arises when a company is in a business environment and a culture, which embraces innovations with as much affinity as the devil has to holy water. This is the case in the highly standard-fixated aviation industry, where the highest safety standards apply to allow us to travel safely around the world with the second lowest rate of lethal accidents per kilometer worldwide (James, 2016), only beaten on this score by the rail transport. To achieve such a high standard of safety, extensive standardization is the most important prerequisite. Lots of time and effort are needed for an aircraft's development for certification reasons, and once such an aircraft or any part of it is certified and approved for operation, it is usually sold and used over decades. Almost all products have very long lifecycles and genuine up-to-date innovation is rare. If a product lasts for 40 years, there is less interest in whether a module, interface, or technology is two to five years more modern. What people care about is that it will be reliable for the next 40 years, since recertification, maybe caused by obsolescence, costs millions. In such an environment, it is extremely difficult to bring in innovation per se, since people working in such environments are not really used to innovation, and rather tend to apply well-tested, reliable and already proven technologies, processes, and products. Still, innovation is possible, if in a limited and possible different manner. The main problem is: How can innovation be implemented in such a culture and environment? How can one person who is responsible for implementing innovation get traction for the innovation's implementation process? How can responsible people improve and speed up the innovation process in such an innovation-averse context? Another major problem beyond the innovation process itself concerns the ability to get the majority of innovation-averse employees on board for such a journey by involving them in the implementation of the innovation. This is the main problem that this dissertation is considering and investigating. In essence, this research is focused on innovation and, in particular, technological innovation in the context of high reliability organizations.

1.2. Research questions and objectives and theoretical propositions

Innovation can be studied from different perspectives. For the purposes of this research, special attention is paid to the organizational context in which innovation takes place, taking into account the current body of literature on organizational ambidexterity, since the concepts of “organizational ambidexterity” and “ambidextrous organizations” are related to types of organizational context that enable innovation. Accordingly, this research focuses on the study of technological innovation in HROs with ambidextrous organizational setups, and, in particular, on the key players involved in these organizational contexts and their interactions.

1.2.1. Main objectives for the research and research questions

The primary purpose of this research project is to find out how and why key players support or hinder the successful implementation of technological innovations and how the interaction or interplay between explorative and exploitative activities influences the successful implementation of a new technology.

Four research questions are proposed, pertaining to two different families of questions:

Questions regarding boundary activities and the interplay between explorative and exploitative activities:

1. How does the interaction of explorative and exploitative activities take place?
2. How does successful transformation of explorative activities into exploitative activities take place over time?

Questions regarding the different key players' roles:

3. What kind of key players support or hinder the relations between explorative and exploitative activities?
4. What impact does the interaction between different key players have on the successful implementation of technological innovations?

The research focuses on how successful interaction between explorative and exploitative activities takes place and how explorative activities transform into exploitative activities over

time and vice versa. Another secondary focus is to find out and define the various roles employees take over in that transition.

1.2.2. Theoretical propositions for the research

A set of theoretical propositions has been defined for the proposed research questions, belonging to two families of propositions.

Propositions Family 1: Boundary activities and the interplay between exploration and exploitation activities.

Theoretical proposition 1: The know-how of exploitative key players, who mainly focus on incremental innovation, is sometimes consulted by explorative key players when it comes to decisions regarding radical innovations.

Theoretical proposition 2: The know-how of explorative key players, who mainly focus on radical innovation, is sometimes consulted by key players involved in exploitative activities when it comes to decisions regarding incremental innovations.

Propositions Family 2: Different key players' roles:

Theoretical proposition 3: There are some key players who *support* or *hinder* the integration of explorative activities into exploitative activities.

Theoretical proposition 4: The interactions between different key players involved in explorative activities and exploitative activities have positive spillover effects with regard to the implementation of technological innovation.

Theoretical proposition 5: Key players support the integration of explorative activities into exploitative activities through the informal sharing of information between themselves.

1.3. Methodological approach of the research

The research relies on case studies as a qualitative research vehicle. The chosen method, i.e. the case study, is expected to offer explanations about the “how” and “why” aspects of the proposed questions. Through the case study methodology, a specific given context can be subjected to applied analysis. Another advantage is that it also promises explanations for cause-and-effect relationships through its in-depth analysis. Case studies also allow a more integrated approach, where trajectories can be more thoroughly studied and analyzed.

Moreover, case studies are a good method for analyzing complex phenomena (Yin, 2003, 2014). Considering that innovation is indeed a complex phenomenon and that “how” and “why” questions are to be answered in this research, the choice of case studies is an adequate method for fulfilling the stated research objectives. The choice of this methodology and its type of application is explained in more detail in chapter 3 of this dissertation, which is devoted to research methods.

1.4. Main contributions of the research

This research contributes to covering several lacunae in current research and developing under-researched aspects in the field of organizational ambidexterity. Not much is known about how organizations go about executing solutions towards ambidexterity to finally lead to the successful implementation of an innovation or about the outcomes that are achieved (Raisch, 2008; Siggelkow & Levinthal, 2003). This study aims to contribute to a better understanding of these aspects.

According to Simsek (2009), there is a need to further develop the study of the moderating effects of specific environmental complexity and dynamism in ambidexterity. He also suggested to investigate different combinations of exploitation and exploration within specific organizations. This study looks at organizations in an innovation-averse environment, which can therefore contribute to developing the theory further. It is also an interest opportunity to examine how organizations adapt to extremely fast or slow-moving markets (Nickerson & Zenger, 2002). This study contributes to this research line as well, as it explores how

organizations adapt in very slow-moving markets, like the highly standardized and regulated aviation market.

There is also demand for more research into the means of decision making and their comprehensiveness (Raisch & Tushman, 2011) with a view to explaining the variance in organizational ambidexterity. This study furthers our understanding of how decision making processes work and how decision makers get the required comprehensive know-how in a reasonable amount of time, also in terms of how informal channels serve this need. The integration of innovations and the mechanisms for making them work is still a major challenge for research (Adler, Goldoftas & Levine, 1999a; Siggelkow & Rivkin, 2006) and as well underdeveloped in theory (Raisch & Birkinshaw, 2008). With this in mind, this study also sheds some light on the integration mechanisms.

Another issue is how senior leadership moderates and balances ambidexterity (Tushman, Smith, Wood, Westerman, & O'Reilly, 2010). How innovation comes about and is integrated is the main focus of this research project, which therefore contributes to filling the remaining gaps in the research. Another aspect analyzed in this dissertation is how different types of key players influence the successful implementation of innovations, which also offers some insights into which kinds of leaders exist and how they influence ambidexterity and its success.

Regarding organizational design, multiple levels are involved in organizations engaging in innovation. Research within ambidextrous organizations needs to be explicit about the level of analysis (Raisch & Birkinshaw, 2008; Rivkin & Siggelkow, 2003) and how these levels interact with one another (Raisch, Tushman, Birkinshaw, & Probst, 2009). This research contributes to the as yet unknown aspect of how these levels act with one another. It applies a multilevel perspective for this purpose.

Current research mainly covers the firmer level of analysis (Rothaermel & Deeds, 2004), whereas the group or individual level is sorely lacking research. Mom, van den Bosch, & Volberda (2007) pointed out that there is a lack of research on organizational ambidexterity at the individual level and that a case study or field study would help develop that area. There is especially much to discover in regard to how individual senior managers influence organizational ambidexterity (Jansen, George, Bosch, & Volberda, 2008). Along these lines, the

findings of this dissertation are contributing to the knowledge regarding the individual level, considering that the role of individual key players and their interactions are explored.

Raisch & Birkinshaw (2008) recommended further research to develop the still weak theory concerning internal and external boundary activities. They especially refer to the boundary activities within ambidextrous organizations and the boundaries between exploitative and explorative units. Raisch & Tushman (2011) add that it would seem worthwhile to find out more about how boundaries between exploitative and explorative units contribute to the organizations' ability to exploit and explore. Furthermore, they suggest further study of the type of boundary activities that exist and how they manifest themselves. Next to boundary activities, the aspect of connectedness was found to be important and deserving of further investigation (Jansen, Tempelaar, van den Bosch, & Volberda, 2009). There are also open questions on the trade-off between linking activities and organizational separation (Taylor & Helfat, 2009), which need further attention. This research is aimed at further developing our knowledge of boundary activities, i.e. what type of boundary activities there are and what their contribution is. These issues are mainly covered with the theoretical propositions 1 and 2.

Another spot that needs further research is how knowledge integration happens through its direct transmission channels, how this is coordinated across hierarchical levels, and how this challenge is being tackled by management (Raisch & Birkinshaw, 2008). With regard to knowledge sharing (Raisch, 2008), it remains mostly unclear how organizations build capabilities for boundary spanning activities and how this influences exploitative and explorative learning. This study adds some contribution to our understanding of how knowledge integration happens and how informal transmission channels contribute to spreading and sharing knowledge. It also contributes to a deeper understanding of how organizations form boundary spanning activities that support ambidextrous organizations.

As Simsek (2009) states, organizational ambidexterity still remains an undertheorized, underconceptualized, and, therefore, poorly understood phenomenon. This study generally picks up this author's call and further develops our knowledge around organizational ambidexterity.

To conclude, this research is relevant because it enriches current literature on organizational ambidexterity by distinguishing aspects regarding how innovation is implemented in ambidextrous organizations. Organizational ambidexterity has become a relevant topic within

business research, but it still remains under-researched. How ambidextrous organizational structures are managed in certain industries in many cases remains unclear.

The organizations of some industries, such as the aviation industry, creates difficulties with developing innovations, since almost the entire workforce is forced to follow rigid processes for safety reasons and, therefore, is not likely to comply with innovation projects, where creative people would be needed. With this research, the author tries to contribute to an interesting insight for academics regarding the different players that are working in and influencing ambidextrous organizations and the most promising ways for implementing innovations in quasi-innovation -averse high reliability organizations. Therefore, some untouched spots within current literature on organizational ambidexterity are covered and explained with the results of this research.

From a practical point of view, practitioners can benefit from thoroughly explained causal relations and detailed background information on how to establish a winning team to implement innovations, how to communicate within such undertakings, and how to involve the workforce that finally leads to successful innovations within HROs. This study is mainly relevant, because it investigates how different players influence successful innovations. An insight into such subliminal forces and knowledge about how to steer them is not only interesting, but also crucial for successfully implementing innovations. Furthermore, a sort of do-and-don't catalogue can be formed in the form of practical implications that help overcome stalled situations and recover momentum in order to implement innovations faster and with more focus.

1.5. Structure of the dissertation

This thesis uses the following structure: It starts with the introduction chapter in which the problem statement for this study is presented. Second, the research questions and the objectives of this research are exposed. Derived from the research questions, the theoretical propositions are then outlined. Finally, the chosen research method and the main contributions of this research are explained.

The second chapter is devoted to a review of current literature to substantiate the theoretical propositions.

The third chapter is focused on the research methods applied in the thesis.

The methodology chapter is followed by a chapter on the actual findings, outlining the main results of the research. This chapter is subdivided by case study one and case study two, followed by the chapter “Discussion of the results” which links the findings to the theoretical propositions and another section which links the findings to the theory and, finally, to the research objectives.

The last chapter is presents the conclusions and implications, focusing on implications of the findings for practitioners. Finally, further research avenues are suggested and the limitations of the study explained.

The concluding parts contain the abbreviations, bibliographical references, and appendices, with different relevant attachments that were either prepared for the case studies or summarized after the case studies were completed successfully.



2. LITERATURE REVIEW AND THEORETICAL PROPOSITIONS



2.1. Introduction

The following “Literature review and theoretical propositions” presents the theoretical foundations of this thesis that underpin the relevance of the subject. The first subchapter “2.2. Innovation: An overview” explains the different streams in current literature in the domain of innovation and how they relate to this thesis. The second subchapter “2.3. Organizational ambidexterity: An overview” also revisits the theoretical stream of organizational ambidexterity with a view to the objects of this thesis. Both of these subchapters also cover the status quo of academic literature regarding the subject at hand. The last subchapter embeds the theoretical propositions of the research, which derived mainly from innovation and organizational ambidexterity literature. However, other related theoretical streams, such as organizational design, project management, leadership, and several others are also feeding into the eventual propositions.

2.2. Innovation: An overview

Innovation per se relates to a process of developing a new product or a new practice, or a new way of doing things (Freeman, 1982; Drucker, 1985). It is also worth to mention that an innovation or, as already stated, anything new, is always dependent on the eye of the beholder. What is new for one industry or organization might not be new for another (Daft, 1978). This can be any kind of idea, process, or product. In other words, a regularly used process by one industry, e.g. carbon fiber in the bicycle industry, can become an innovative process for another industry, e.g. the aviation industry, due to having reached a specific load factor or quality that is required to match the requirements (Zaltman, Duncan, & Holbek, 1973).

On the other hand, Gopalakrishnan and Damanpour (1997) propose the following dimensions regarding innovation:

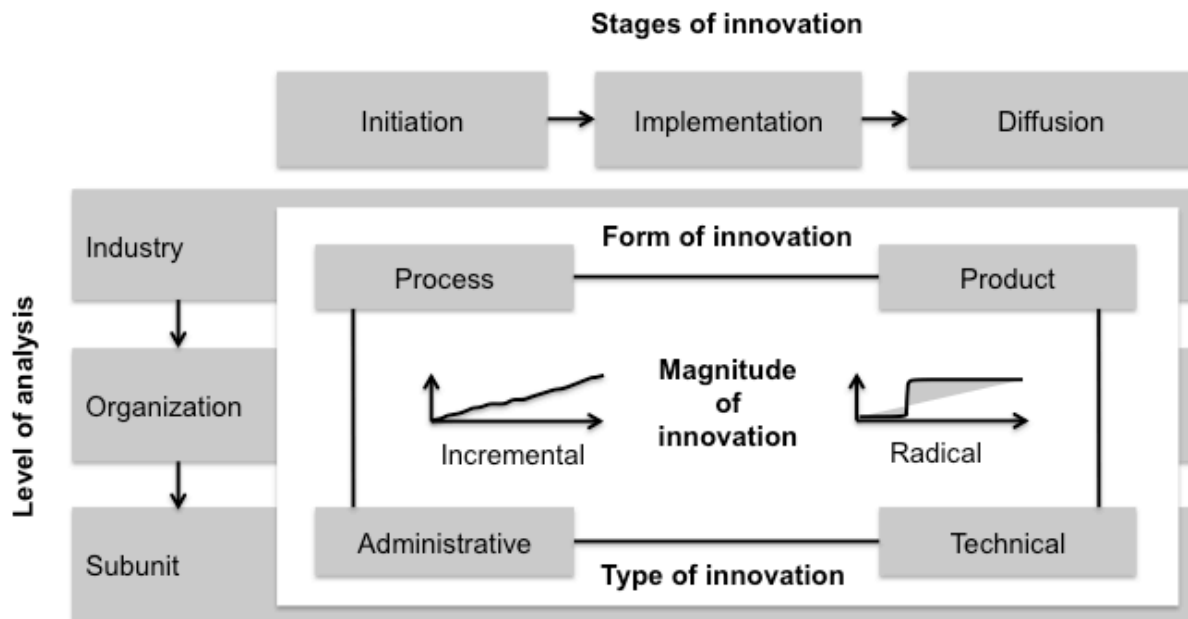


Figure 1: Dimensions of Innovation

Source: Adapted by the author from Gopalakrishnan and Damanpour (1997)

The many kinds of innovation have been discussed on a regular basis since Schumpeter (1942) described the topic with its immediate effects on the economy. Innovation as an outcome can manifest itself in different characteristics. According to Gopalakrishnan and Damanpour (1997) (see Figure 1), one can distinguish between: 1) the form of innovation, namely whether it is a new process or a new product; 2) the type of innovation, namely technical or administrative innovation; 3) and the magnitude of innovation, which can be either incremental or radical (Crossan & Apaydin, 2010).

These different dimensions of innovation can be explained along the following lines.

2.2.1. Forms, types, and magnitude of innovation

2.2.1.1 Process innovation

One of the many forms of innovation is process innovation, which refers to a newly adapted or created business or work process. New or improved processes can claim much of the credit when

companies become more efficient. Abernathy and Utterback (1978) claim “that more than half of the reduction in cost ... has been the result of gradual process improvements which could not be identified as formal projects or changes” (p.41). They state that said process improvements simply took place, without having formally applied for funds or the time necessary to improve a process. Such innovations take place within the business or working process that finally affects the services or products within a company or within a company’s overarching processes, such as the supply chain or the distribution channels.

Process innovation can have a substantial impact on productivity (Ettlie & Reza, 1992). This can be achieved when a new technology is implemented in a business process and used as suggested by the OEM (Original Equipment Manufacturer) or even when the process as such is adapted to suit a new technological setup better, but is then genuinely and incrementally adapted until it fits the individual need of the manufacturer. This could, for example, be a fast milling machine replacing an older and slower one, while the interfaces of the new machine with its immediate environment, like neighboring machines, related stock etc., are not yet at their optimum and are, incrementally and over time, adjusted to perfectly suit the new technology. In general, process innovation is said to happen in the later stages of a product’s life cycle and declining markets, whereas product innovation happens in growing markets (Tushman & Moore, 1986). This derives from the fact that economies of scale and shrinking margins fall, due to other players entering the market. Process innovation can then reduce costs and leverage margins.

2.2.1.2 Product innovation

The second form of innovation, next to process innovation, is product innovation, which is usually thought of when talking about innovation. Product innovations have a latent ability to renew a firm and its equivalent capabilities (Danneels, 2002) and can therefore also affect or impact on the dynamic capabilities of such firm. Product innovation, for example, an innovative packaging machine that incorporates other steps such as printing and labeling in addition to simple packaging, could be used to improve the assembly line of a larger company, becoming part of process innovation (Abernathy & Utterback, 1978). Companies that are in fast growing markets with their products should by nature be product innovators (Capon, Farley, Lehmann, & Hulbert, 1992), since newly innovated products are positively correlated with product sales (Hambrick & MacMillan, 1985; Miles & Snow, 1978). Moreover, products with short life cycles

demand faster recurring product innovations (Ansoff & Stewart, 1967). The HRO (High Reliability Organization) environment and, specifically, aviation and air traffic control services, is characterized by limited innovation activities and very long product life cycles due to the rigid and expensive certification processes that every product needs to undergo before being implemented. In such environments, safety-conscious employees are usually likewise wary about embracing innovations that might imply certain risks. Therefore, innovation or product champions are needed to push product developments through usually not overly innovation-friendly exploitative corporate environments (Maidique, 1980).

Product innovations are, in general, strongly promoted through reasoning between different players from different backgrounds, which then contribute their specific knowledge, although this is dependent on the ease of communication (Ebadi & Utterback, 1984). Such communication and interaction is mainly supported in the informal organization (Capon et al., 1992), as was first revealed, according to von Kutzschenbach (2006), through a social network analysis undertaken by Burt (1992).

2.2.1.3 Administrative Innovation

Innovation can also be administrative or technical in nature, with both concerning the outcomes rather than the process of innovating itself. An important distinction between administrative and technical innovation relates to their different evolution regarding their adoption, as adoption or the failure to adopt are found to constitute distinct processes (Downs & Mohr, 1976) as explained below. Administrative innovation refers to work activities and managerial aspects, such as policies of recruitment within the human resource department, allocation of resources and authority, or the structuring of tasks, as well as the organizational structure itself (Daft, 1978). Technical innovation, on the other side, consists of “processes and technologies used to produce products or services” (Crossan & Apaydin, 2010, p.1168-1169).

Administrative actions or practices, such as those exhibited by top management, do have a certain impact on innovation. Next to being a role model, top managers set the standards and the processes for the employees of a company and should provide incentives to innovate, encourage initiatives, and finally approve or reject innovations (Daft, 1978) with appropriate reason. Administrative innovation usually originates in upper management, since the related

topics concern ways, processes, and manners of management, structures, and the management of human resources itself (Evan, 1966). Nevertheless, many administrative initiatives also originate on lower hierarchical levels. Administrative innovations are found to be more successfully implemented with a high degree of formalization, centralization, and low complexity, even though pushed through the hierarchy and onto the working level (Daft, 1978), whereas technical innovations are most successfully implemented with low formalization, decentralization, and high complexity. However, a tight coupling between the administrative and technical working level is considered beneficial for the implementation of technical innovations.

2.2.1.4 Technical innovation

Technical innovations include product and process innovations as well as the technologies used to produce products or services. It is generally distinguished from administrative innovation by involving some form of technology which is necessary for operation (Crossan & Apaydin, 2010). Such technical innovations can be expected from technical core employees, such as leaders and other professionals (Evan, 1966). Technical or technological innovations can have unforeseen impacts. New customers segments, business models, or new required networks might emerge (Abernathy & Clark, 1985; Rosenkopf & Nerkar, 2001; Tripsas & Gavetti, 2000) that can force an adaptation in the organization itself.

Most technical innovations are said to be generated bottom up, since specialist and engineers working with technology usually are located on the lower levels of management, while the upper management is detached to some degree from technology (Evan, 1966). Approval processes therefore different from those for administrative innovations, which usually occur top-down, as technical innovations evolve from the bottom up unless enforced by upper management, as Evan points out. On the other side, initiatives that are wished and commissioned by upper management are usually not very welcomed by the technical workforce which is forced to implement them and who might resist the upper management's influence (Daft, 1978). Technical core employees resist adapting new innovations when they are committed to a professional ideology and sometimes have been using a certain technology for decades (Zald & Denton, 1963). Still, such resistance can be mitigated through well-established collaboration practices as described by (Daft, 1978).

Daft (1978) found that the higher the professionalism of employees within a technical workforce, the more implementation will be promoted by that technical workforce. Technical innovations are said to be more efficiently implemented through collaboration with the administrative or managerial level (Daft, 1978). The latter is becoming more knowledgeable about the innovation through collaboration and can therefore share the resulting knowledge within and beyond their managerial level. It is also interesting to note that technological innovations are said to be able to awaken so-called explorative stimuli within exploitative units (Brunner, Staats, Tushman, Upton, & Morgan, 2010), where such interventions trigger a positive learning experience with new technology which can become beneficial later.

2.2.1.5 Incremental innovation

In terms of the magnitude of innovation, below radical innovation, there is incremental innovation (Crossan & Apaydin, 2010), which occurs in the form of improving existing products, processes, or services in order to exploit the current design (Dewar & Dutton, 1986; Ettl, Bridges, & O'Keefe, 1984; Nelson & Winter, 1982; Tushman & Anderson, 1991). Incremental innovation is allocated to exploitation, whereas radical innovation is related to exploration (Jansen, Van Den Bosch, & Volberda, 2006). However, innovations can also be more gradually differentiated between very radical, just radical, intermediate, major incremental, or minor incremental in nature (Abetti, 2000). While radical innovation fundamentally changes an established technology or diverts away from the current practice, incremental innovation implies small adjustments to the currently used technology (Duchesneau, Cohn, & Dutton, 1979; Nelson & Winter, 1982). The major difference between both magnitudes of innovation is the degree of newness they embody. It is worth to mention that managers are likely to perceive innovations as radical or incremental in terms of the risks implied by them (Dewar & Dutton, 1986). Innovations can also be categorized by their constructs. They can be differentiated regarding the linkages between the existing core concepts (Henderson & Clark, 1990). If the linkages remain unchanged and the core concept is reinforced, it is considered incremental innovation. Whenever these linkages remain unchanged, but the core concept is overturned, it is considered modular innovation. When the core concept is overturned and the linkages change as well, it is considered radical innovation. And finally, when the linkages are changed and the core concept is reinforced, it can be termed architectural innovation (Henderson & Clark, 1990).

Dewar & Dutton (1986) discovered that incremental innovations that embody thorough process adjustments require specialist expertise from different disciplines and, as such, intense communication. Incremental innovation is also likely to be characterized by several organizational units working together, driven by the prospects of economic returns (Tushman & Anderson, 1986), whereas in radical innovation it is stated that champions are needed more to push innovations through, not least against resistance. Such resistance towards the adoption of innovation is less likely in incremental innovations by contrast to radical innovation, since the outcome is more predictable, considered less threatening to job security, and usually less costly than radical innovation (Dewar & Dutton, 1986).

In regard to managing innovations in general and allocating decision making powers to the right level in the initiation phase of innovation, authority should be de-centralized in order to improve the circulation of necessary information between the different players. In the implementation phase, the same power should be centralized in order to circumnavigate ambiguity and conflicts (Zaltman et al., 1973). However, this depends strongly on the scale of the innovation. Incremental innovation is said to be more dependent on formal and decentralized structures in order to allocate decision making power and incentivize work autonomy (Ettlie et al., 1984). Furthermore, incremental innovation is said to reinforce the capabilities of established organization (Ettlie et al., 1984; Hage, 1980) and thereby strengthen intrapreneurship through autonomy.

2.2.1.6 Radical innovation

Radical innovation happens when a totally new process, product, or service replaces a former process, product, service, or setup of value creation or creates a new class of process, product, or service (Meyer, Brooks, & Goes, 1990; Tushman & Anderson, 1991). For such reason, it is also called disruptive, discontinuous (Gatignon, Tushman, Smith, & Anderson, 2002) or, often, exploratory innovation (Christensen, 2001; Raisch & Birkinshaw, 2008). Innovation is also called radical when it is better in every aspect, as however much of the old technology is being improved or supported, it could still never compete with the new one (Mensch, 1979). Radical innovations can open new market potential and applications (Dewar & Dutton, 1986; Ettlie et al., 1984) or even redesign industries, regarding their ramifications (Tushman & Anderson, 1986) and relocate existing boundaries within such industries. In the case that a new process replaces

an older one, in particular one made obsolete by introducing a new technology with substantial R&D spending, it can also be called radical (Ojasalo, 2008). In such a case, radical innovations are also considered competence-destroying from the perspective of the old technology of the manufacturers (Abernathy & Clark, 1985), since they replace the production and, by implication, the competence for such obsolete production. Nowadays, radical innovation is also often associated with business model innovation or architectural innovation (Henderson & Clark, 1990; Crossan & Apaydin, 2010), such as iTunes revolutionizing the music industry.

When developing a new technology, that period of development is usually characterized by a high level of experimentation and confusion until a dominant design establishes itself (Abernathy & Utterback, 1978; Henderson & Clark, 1990). Once a radical design of a new technology has emerged in its form, architecture, and components and become an established standard, incremental innovation or the exploitation of the technology takes over in a smooth transition, without changing its architecture or core functionality (Henderson & Clark, 1990). From a longitudinal perspective, radical innovations are usually breaking long periods of incremental change within a certain domain of technology and only occur in rare occasions, but alter the entire standard of a certain technology and its environment (Miller & Friesen, 1984; Tushman & Anderson, 1986). Such changed environment brings uncertainties not only to the inventor of such technology, but also to the producers of the old technologies who have a set of knowledge regarding the legacy technology, but may lack the required knowledge or processes needed for the new technology.

New radical innovations also differ in terms of their impact. Some are competence enhancing, as knowledge transfer of the legacy technology can happen to a certain extent. For example, Boeing went from piston engine aircrafts like the Douglas DC-3 to jet propulsion aircraft such as the Boeing 707. Others are competence destroying, such as the steam ships that ended the age of sail in maritime trade (Tushman & Anderson, 1986). Radical competence enhancing technology therefore tend to support and fortify existing players in an industry, whereas competence destroying technology allow new players and entrepreneurs to enter such markets (Astley, 1985) who might then dominate the industry if the existing players cannot catch up with them and their innovations. Technological discontinuities or radical innovations, be they competence enhancing or competence destroying, can offer opportunities for players that are willing to invest and build up new knowledge. Such willingness is mostly correlated with increased growth rates (Tushman & Anderson, 1986), but still technological breakthroughs can

rarely be predicted in advance. Therefore, organizations are well advised to scan their industry and established technologies (e.g. with technology scouts) and also train to adopt emerging technologies quickly in order to have the best chance as first movers or fast followers (Dutton & Thomas, 1985).

When looking at the innovation process itself, the required knowledge also changes throughout the process of innovation and its future applications. In the infancy of a new technology, a corporation knows few things about many components of an innovation and its architecture. Usually, there are several adequate and promising applications of such innovation before one becomes dominant. Once the application is narrowed down and the design becomes a standard, the corporation changes to knowing a lot about one certain architecture and composition of components (Henderson & Clark, 1990) and leaves or moves away from other possible applications of said technology.

When an organization is confronted or threatened with an outside radical innovation within its industry, the existing networks, be they players, suppliers, distribution channels etc., can become obsolete when a new architecture of components is inherent in the innovation. In such a situation, companies have to establish a new set or array of networks, maybe including new players, and therefore knowledge to respond to such innovations (Tushman & Anderson, 1986; Henderson & Clark, 1990).

With regard to changes that a radical innovation can bring, radical innovation is considered as second-degree change compared to a first-degree change that relates to incremental innovation (Meyer et al., 1990). Meyer et al. distinguish between firm and industry levels, where first-degree change is defined as an adaptation at the firm level and an evolution at industry level. Second-degree change at the firm level is defined as a metamorphosis and as a revolution at the industry level.

Finally, pursuing radical and incremental innovation at the same time requires a different set of capabilities, i.e. ambidextrous capabilities whose interplay is so far underdeveloped (Crossan & Apaydin, 2010).

To conclude this section, it must be clarified that the focus of this research is on technical innovation (i.e. product, process, or technological innovation). In particular, the two case studies relate to, respectively, product and process innovation.

2.2.2. Stages of innovation

Any innovation process contains several distinct stages. In the first stage, the innovation needs to be generated which usually starts with an idea and a project definition, followed by possible problem solving processes, the design and development of the innovation, and its eventual commercialization (Saren, 1984; Gopalakrishnan & Damanpour, 1997). In a second stage, the innovation, when not protected by patents, needs to be diffused, brought to the market, and made into a standard in terms of form and function (Tushman & Anderson, 1986). In a third stage, the innovation might be adopted by other companies, where it also needs to be initiated and implemented within their organizations (Ettlie, 1980; Zaltman et al., 1973). These stages can be regarded a business process in themselves, which, according to van de Ven & Poole (1995), implies certain organizational actions, such as communication, workflows, decision making processes, or other methods.

From a business perspective, the initiation comes first, with the generation of the original idea and the formation of a decision as to whether an innovation is needed or not (Crossan & Apaydin, 2010; Davila, Epstein, & Shelton, 2012). In a second step, the development and implementation follows with the required project management. The last step covers the commercialization or diffusion of the innovation (Crossan & Apaydin, 2010). In this thesis, the view of innovation as a business process was given priority, since the focus is more on the implementation of innovation itself than on the generation of innovation.

2.2.2.1 *Initiation of innovations*

As outlined above, an innovation can either be adopted from an outside source or generated by the organization itself. Innovation are generated through the interplay of problem solving and decision making (Gopalakrishnan & Damanpour, 1997), where a new tool, a new way of doing things, or a new service is being established and might become an innovation proper. Such

output very often does not end up as it was intentionally planned, but rather as it developed in other applications or settings. For example, the technology behind post-its from 3M were originally designed as an ultra strong adhesive for the aviation industry, but ended up as an incredibly weak low pressure adhesive called acrylate copolymer microspheres (Hiskey & Deezen, 2011).

The initiation of an innovation usually starts with the recognition of a need for it (Ettlie, 1980; Gopalakrishnan & Damanpour, 1997) and is followed by a decision whether to start the innovation. Frequently, innovations initially start with the shifting of manpower, which can either be internal or external personnel. New manpower, for instance, with distinctive knowledge about a technology that is not yet available in the market, can have an impact in the form of initiating innovation (Ettlie, 1980). Such flow of personnel can also occur between boundaries inside the organization, for example, between exploitative players and explorative players. An exploitative player or an explorative player might bring new knowledge and set off incremental or radical innovation. The boundaries in question here can be defined as either intentionally created boundaries, buffering boundaries used to isolate a team more from others, or spanning boundaries through which an isolated team connects with others in order to receive knowledge or gain access to something or somebody's knowledge or authority (Yan & Louis, 1999). The flow of manpower was found to be tremendously important in the case of external manpower, because it forms the vehicle whereby knowledge shifts from one organization to the other, as one organization gains knowledge and the other loses it, according to Ettlie (1980). A new employee who comes from a totally different company and maybe a different industry first has to learn the ropes, before he or she is able to introduce an innovation into the new system (Ettlie, 1980). This author also concludes that incremental innovation is facilitated more by existing manpower, whereas radical innovation is more likely initiated by new manpower that brings in new expertise. Companies and their personnel that are engaged in the adoption and generation of innovations would usually bundle such actions in a portfolio of innovation projects, where they can be streamlined and managed with standard procedures (Crossan & Apaydin, 2010).

2.2.2.2 Implementation of innovations

The actual implementation of an innovation follows the stage of its initiation. This usually requires dedicated project management, problem solving, and design and development processes

that can, but do not have to be located in a structurally separate project or program team reporting directly to the board of directors, or in organizational integrated subunits (not separated from the core organizational structure) (Crossan & Apaydin, 2010). A company that is implements innovations systematically should establish a portfolio of innovation projects that include incremental projects to improve margins and radical projects to build up new capabilities and assure future income (Wheelwright & Clark, 1992). The organization should then designate the responsible persons accordingly.

Electing a project manager for an innovation is a crucial task going along with the team's configuration that should consist, depending on the type of innovation, of an appropriate mix of experienced professionals and newcomers (Reagans, Zuckerman, & McEvily, 2004; Chen, 2005). The project manager is responsible for transforming the innovation into something that can be used in routine work after the original implementation and, of course, creates a substantially better, faster, safer, more reliable state of affairs. The key success factors in implementing innovations with project management are efficiency, communication, and collaboration (Adams, Bessant, & Phelps, 2006). Successful project management also depends on the measurement or the definition of what "success" means: The goals should not only be the 'hard' output of innovation, but also the effort that is put into it, according to Hauser and Zettelmeyer (1997). They also stated that innovation implementing players should not only be measured against internal but also against external benchmarks. If solely measured against the internal state of affairs, project managers are incentivized to develop a "not invented here" mindset. By contrast, when they are only measured against the external perspective, then they are incentivized to engage in a type of research that might lead them to deviate too much from the current line of the company (Hauser & Zettelmeyer, 1997). In such cases, the key is to engage in a continuous and balanced process of checking of what the outer world can offer and build on the existing status and knowledge within it. Processing and implementing innovation depends on the type of innovation and on the professional level of the implementing workforce (Daft, 1978). He also found out that innovations are usually initiated and implemented in the domain of the specialists that are actually using the innovation in their function. As a result, innovations that are implemented by the core specialists are more successful in their implementation than others. Regarding the organizational setup, according to Damanpour (1991), technical innovations are more easily implemented in organic structures, whereas administrative innovations are less complicated to implement in mechanistic structures. Implementing innovations also needs full

control by top management (Zaltman et al., 1973), which should be based on a good mix of formal and informal methods.

2.2.2.3 *Diffusion of innovations*

The last step within the innovation process, according to Gopalakrishnan & Damanpour (1997), is its commercialization. The commercialization of an innovation is essentially the predecessor activity of the eventual diffusion of the innovation itself. For the purposes of this study, the innovation process refers to the model of Crossan & Apaydin (2010), according to which the stage of commercialization overlaps with the diffusion of an innovation. The commercialization stage is regarded the least developed stage in the process (Crossan & Apaydin, 2010; Davila et al., 2012). The diffusion of an innovation can affect the industry in which a corporation is active, and it can as well have spill-over effects on other industries, depending on the type of innovation and its applications (Tushman & Anderson, 1986). Major technical breakthroughs or radical innovations can affect several industries, since they open new prospects for the technology, which usually cannot be predicted until its full capabilities become clear. Throughout the diffusion process, experimentation will prevail until a dominant design is established (Tushman & Anderson, 1986). Reaching this type of factual consensus depends a lot on social, political, and organizational dynamics which influence the eventually dominant design (Anderson & Tushman, 1990).

Incremental innovations are diffused differently and affect other industries less directly. Still, first movers and pioneers have several advantages. The early adopters of innovations are also found to have higher growth rates compared to others. Finally, whether an innovation becomes a breakthrough or not is hard to predict, so being able to adopt an innovation fast is said to be a key competence in today's fast-moving markets (Tushman & Anderson, 1986).

Finally, the main body of literature covered for this thesis, as listed above, had to be challenged epistemologically in terms of how "successful innovation" is defined. Current studies analyzing innovation processes propose a social constructionist approach (Colurcio, Wolf, Kocher, & Spina, 2012). In the social constructionist view, people describe and explain their view of the world in which they live themselves (Gergen, 1985). In such a constructionist view, it is up to the different units of analysis to consider what successful innovation means to them.

For the first two units of analysis considered in the case studies in this dissertation (i.e. the organization itself and the program team), an innovation is considered successful when budget, time, and outcomes remain within the originally defined limits. For the last unit of analysis, the individual player, an innovation is also successful as long as it stays within the original budget, time, and expected results. This approach allows the author to get an understanding of how successful innovation is implemented in a company's internal networks and within existing professional and personal relations.

2.2.3. Level of analysis

Regarding the level of analysis of innovation, one can distinguish between the industry, organization, and subunit levels. The industry level itself can have an extra-industry or an intra-industry perspective (Crossan & Apaydin, 2010), whereas innovation can be regarded either as a process or an outcome on the organizational level. On the subunit level, intra- and extra-departmental perspectives can be distinguished (Gopalakrishnan & Damanpour, 1997). Determining the level of analysis is important for the reaction and dynamics that the different levels show when faced with either radical or incremental innovation. Furthermore, the different levels of analysis, such as the industry level compared to the organizational level, can be faster or slower in response to innovations regarding the other level (Meyer et al., 1990). For example, an industry can already be far advanced on the path towards Industry 4.0, while any single given organization still does not have automated processes.

2.2.3.1 *Industry level (environmental)*

The environment and the industry in which an organization is active has an impact on its specific organization regarding innovations (Tushman & Romanelli, 1985; Tushman & Anderson, 1986). This influence can depend on the culture as well as on other factors, such as the nature of the business. HROs belong to an environment where occasionally the unexpected or even dramatic events have to be managed (e.g. an airline or a hospital). Such environments, combined with unintentional incidents, can cause crises or endanger life and limb (Weick & Sutcliffe, 2007).

This research project applies an intra-industry perspective (Crossan & Apaydin, 2010), within the HRO environment. HROs tend to follow rigid processes with self-created automatisms that are applied on a daily basis in order to circumnavigate the risks of the operations. HROs often respond to the limitations imposed by the nature of their operations with an inverted hierarchy, since the person on the frontline has all the information and has to make the decisions, which is not the case in most common businesses. Stable and rigid processes which have to be applied repetitively demand mechanistic structures which are not innovation-friendly (Kaudela-Baum, Holzer, & Kocher, 2014). These influence the innovative capacities as well as the industry or the context in which an organization is active (Pittaway, Robertson, Munir, Denyer, & Neevly, 2004). At the same time, the innovativeness of an organization is also strongly related to its exposure to the pressures of the market (Capon et al., 1992), while also being limited by the circumstances of the HRO environment at the same time (Anderson & West, 1998). Other environmental factors (e.g. competitors) also have an influence on the innovation activities of companies, as they also adopt innovations in order to stay competitive (Kimberly & Evanisko, 1981). While relying on stable processes, the companies in high reliability industries still need to master the pressures of competition and innovate under such circumstances. Innovating in the HRO environment also means changing established and stable resilient processes incrementally or radically, which must be perceived by such organizations as figuratively betraying themselves.

High reliability organizations seek to establish, as their greatest priority, stable and resilient processes in order to deliver their products and services in the safest possible way. High reliability industries undergo the same cycles of reorientation and convergence as others do (Tushman & Romanelli, 1985), albeit in a less playful and more risk-averse manner and setting. However, in the aftermath of a technology's obsolescence or a breakthrough innovation, these industries also tend to be more open than before the disruptive change and have greater demand for innovations (Tushman & Anderson, 1986). Other factors influencing the industry can be the high standard of regulations imposed not only by governments, but also by other organizations, such as the ICAO (International Civil Aviation Agency) (ICAO, 2016), which is a specialized agency of the United Nations setting the standards for civil aviation worldwide. Raisch (2006) found that in slow-moving environments of this nature, the need for exploration or innovation is reduced compared to fast-moving environment, which could apply to HRO environments. These HRO environments, which usually lie near the lower end of the continuum between slow and

fast-moving environments, are characterized by highly stable processes and therefore also, to some extent, by a slow pace.

2.2.3.2 *Organizational level*

The organizational innovation has been studied from various perspectives concerning innovative capabilities (Pettigrew, 1985), as innovation can be regarded as either a process or an outcome (Crossan & Apaydin, 2010) or in the form of the organizational evolution through cycles of convergence and reorientations (Tushman & Romanelli, 1985). In general, the organization, in particular the structure of the organization, determines and influences the innovative capability of the organization itself (Burns & Stalker, 1961) or, as Capon et al. (1992) put it, “the formal arrangement of structures, processes, methods and procedures that detail how organization’s members have to behave can affect innovation” (p.161). There are organizational forms that tend to support radical innovations and others that rather support incremental innovations (Ettlie et al., 1984). Official or formal organizations also have informal organizations with their own informal rules and behaviors that also form structures in themselves (Tushman & Nadler, 1980) and can equally have an influence on innovation.

Considering innovation from an outcome perspective, leadership plays a crucial role, since leaders occupy important positions within the organization (Zmud, 1982). The communication, especially from the leaders and top management, that is taking place within an organization can impact the organization itself, formally or informally (Galbraith, 1973). Both ways of communication, formal and informal, are essentially important for building the architectural knowledge about the design of an innovation (Henderson & Clark, 1990). Another factor in facilitating innovation is knowledge spreading and the communication needed for it within and throughout the organization. The simple frequency at which knowledge is distributed also supports innovation (Ebadi & Utterback, 1984).

Considering innovation from a procedural point of view, Zaltman et al. (1973) found the following five steps solidified in several studies regarding the innovation process: 1. Knowledge-awareness, 2. Formation of attitudes, 3. Decision, 4. Initial implementation, 5. Continued-sustained implementation. These steps are rather generic, but they state the procedural, internal view on how innovations are developed within an organization. However, there are different

models referring to the innovation process (King, 1992) with different perspectives and different focal points. When applying the procedural view to organizational innovation, it is key to let information and knowledge flow within the organization, which is usually facilitated also by moving around people in the organization (Ettlie, 1980). In section below, some of the main determinants of organizational innovation are examined in more detail.

2.2.3.3 *Subunit level*

Regarding innovation at the subunit level, (e.g. R&D departmental level), one can distinguish between intra-departmental, which contains innovation favoring aspects such as communication, decision making, tenure, diversity and leadership, i.e. all factors that affect innovation itself within an unit, or extra-departmental innovation that covers the interactions with regard to innovation between different departments, such as R&D, design, or manufacturing (Gopalakrishnan & Damanpour, 1997). Subunits or working groups also establish a certain climate within the subunit itself, which evolves over time as players relate to each other. According to the phase model of Tuckman (1965), players that are coming together in a project team or otherwise in a non-temporary organizational subunit create their own climate, culture, language, and behavior. That climate has a direct effect on the work group's output (Anderson & West, 1998). West (1990) suggests the four-factor model in order to steer the work group climate and therefore indirectly influence innovation, which suggests that four major factors: vision, participative safety, task orientation, and support for innovation (Anderson & West, 1998). The factor participative safety states that non-threatening trust and support exists when the individual is encouraged to participate in decision-making, invest in the outcome of an innovation, and is personally committed.

Innovations and their adoption depend a lot on their actual performance, but also on the evaluation of key players regarding the impact an innovation will have on their remits (Kimberly & Evanisko, 1981). Positions, roles, and communication links between the key players in an organization also have crucial influence on the adoption of innovation (Baldrige & Burnham, 1975), as such players might influence other players, teams, departments, or even the company as a whole.

Having exploitative players working together with explorative players can create zones of tension because of the opposing foci and its poles. Explorative players have been found to even have different personalities compared to exploitative players (Amabile, 1996). One type, the exploitative player, tends to arrive at work with a pile of paper on the left side of their desks, which should end up on the right side in the evening, whereas the other, the explorative player tends to keep constantly untidy desks. This is related to being more stable and knowing exactly what to expect, while the other type appreciates more creative disorder at work. Creating such interdisciplinary teams (combining explorative and exploitative players) is considered value adding by creating creative tension zones (Kaudela-Baum et al., 2014). Nevertheless, if players of interdisciplinary teams are geographically separated, this can hamper informal communication and the sharing of ideas. Another relevant factor is the size of the company. Collaboration gets more complicated the bigger the company becomes or the more the teams are separated from each other. Therefore, boundary spanning competences will become decisive in innovation, next to other factors (Kaudela-Baum et al., 2014).

2.2.4. Determinants of Innovation

Many forces determine and influence the success a company will experience with its innovations. One is the environment and the industry with its unique structure (Cohen & Levinthal, 1990), another is the networks existing upstream and downstream in the value chain or within an industry that could support innovation (Pittaway et al., 2004). Another very decisive aspect is the organization itself in which innovation is to happen: What impediments could harm innovative developments in the organization (Pittaway et al., 2004)? What is its size (Cohen & Levinthal, 1990)? What type of organization is it (Damanpour, 1991)? What are its management tenure or other contextual variables (Crossan & Apaydin, 2010)? And what stage is the innovation currently in (Wolfe, 1994)? Another important aspect for innovation to happen is the individual itself or the group of players engaged in the undertaking (Crossan & Apaydin, 2010). Leadership of the innovation process is a vital element in achieving an innovative outcome (West et al., 2003; Mumford & Licuanan, 2004). Next to simple leadership, dynamic capabilities and the process of innovating itself are decisive elements as well (Crossan & Apaydin, 2010). Moreover, innovations always have to do with combining and applying different sorts of knowledge. As Spender and Grant (1996) and Nonaka, Toyama, and Nagata (2000) found,

knowledge is therefore becoming the primary source of wealth and has begun to replace capital, land, and labor as such.

Regarding the organizational level beyond the individual level (Crossan & Apaydin, 2010), the following elements are considered relevant according to Adams et al. (2006): a) Mission, goals, and strategy; b) Structure and systems; c) Resource allocation; d) Organizational learning & knowledge management and; e) Organizational culture. Having an innovation strategy, which is explicitly communicated by top management and well known and carried out accordingly by the workforce, is an important determinant for successful innovation (Miller & Friesen, 1982). The workforce should know which path to follow and what a company stands for with its value proposition in terms of innovativeness. Considering the form of an organizational design or the organizational structure, this has to match the type of innovation that an organization is pursuing (Burns & Stalker, 1961). Different types of innovation require different organizational setups. The organization's complexity, e.g. in terms of its bureaucracy, is also determining innovative capabilities (Damanpour, 1991). If any idea requires a high burden of administrative effort, this might be hindering the willingness of employees to engage in innovative work. Companies that seek to innovate need to free the resources that are needed to foster innovative thinking, new ideas and their implementation.

According to Nonaka and Takeuchi (1995), the hypertext organization is a type of organization that supports knowledge creation and innovation processes. Hypertext organizations contain three different strata. The first is the innovation stratum, which is organized in project teams and dedicated to generation innovation. In the second stratum, value is added, or a product/service is produced and organized in the common hierarchical manner. The last one is the knowledge stratum, which reflects all the knowledge that an organization possesses (i.e. knowledge repository). In essence, there are three different "organizations" integrated into one another, with each of the three organizations having different cultures and different ways of working. The innovation stratum is responsible for innovation and therefore has to be explorative. In the value added stratum, the focus is on the exploitation or on efficient processes with a high quality of output. These two different strata demand different cultures that need to be established in an organization in order to make both work at their best. The knowledge stratum works with the support of technology, management systems, and other tools, like document management systems. Nonaka and Takeuchi (1995) suggest that knowledge and, by implication,

innovative capabilities, are the only long-term means of differentiation from the competition. Any long-term operating organization has to consider how to maintain knowledge for its future.

Organizational ambidexterity is defined as an organization's ability to be efficient in its daily processes, while simultaneously being able to adapt to changes in the environment (Raisch & Birkinshaw, 2008). This covers the first two strata of the model of Nonaka and Takeuchi (1995). This ability and the ability to retrieve knowledge from internal or external sources become more important in our dynamic and competitive world. A company's internal structure should support the exploitation of existing knowledge and, at the same time, the exploration of new knowledge. In order to be able to exploit existing knowledge successfully and efficiently, a company needs efficient structures with efficient processes (i.e. the value added stratum in hypertext organizations). However, in order to explore new knowledge, a different set up is required. Entrepreneurial or loose structures are needed to support innovation activities (i.e. the innovation stratum in hypertext organization). In the following section, organizational ambidexterity is examined in more detail.

On the other side, if there is no time left to think about innovation and improvements, a large part of the workforce will accordingly not spend time on doing so. Investments into R&D and the intensity of R&D efforts become essential when considering different types of innovation (Parthasarthy & Hammond, 2002). New products require investments into their development, and not only the specific engineers that develop a product contribute to it, but also the marketers or the aftersales staff who stay in contact with the customers and accordingly know their need, doubts, and dissatisfaction with the products they buy. Therefore, most employees in a company can contribute to some extent to the intensive corporate-wide development of products. Another factor related to investment into R&D is organizational learning, which should follow the investment into innovation, and the resulting knowledge that needs to be managed. Gained knowledge needs to be made explicit and available to the organization and lessons learned anchored in order to avoid similar mistakes. This is a major concern for High Reliability Organizations, that is, the ability to learn from mistakes (Weick & Sutcliffe, 2007). Moreover, leaders can and should support innovation by giving room and time for experiments and by accepting the risk of possible failures (King, Anderson, & West, 1992).

Another important determinant for innovation is the organizational culture itself. The autonomy of a person to experiment and think, tolerated by the company, can be decisive

(Amabile, 1998) as can the very essential motivation of employees to contribute to innovations (Miller & Friesen, 1982). Motivating environments, good team spirit, and open communication can support the intrinsic motivation of employees to share their ideas and contribute to the wellbeing of a company. However, it all starts with having a shared mutual understanding that is explicitly communicated by the company's vision (West, 1990).

2.3. Organizational ambidexterity: An overview

2.3.1. Organizational ambidexterity: Introduction to the concept

The concept of organizational ambidexterity is narrowly related to the concepts of exploration and exploitation that have to be clarified first.

Exploration seeks to search and experiment, as an organization or as an individual within it, while exploitation aims at making a profit from the results, while also improving the productivity and efficiency of the operations (Lavie, Stettner, & Tushman, 2010). Duncan (1976) suggested the creation of separate units in order to pursue exploitative or explorative activities, since each type of activity requires different organizational setups and possibly different cultures. An organization that is focusing on exploitation tends to focus on stability rather than flexibility, whereas an organization that is focusing on exploration tends to go for flexibility more than stability (Hannan & Freeman, 1977, 1984).

A tremendous organizational challenge for organizations that have invested solely in one of those sides is to change their focus later on and attempt to establish competences on the other side (Sorenson & Stuart, 2000). This is supported and reinforced by the findings of Benner and Tushman (2003) and Levinthal and March (1993) who stated that such trade-offs are followed by path dependencies, since an investment into one path drives out possible investments into the other. Holmqvist (2003) stated furthermore that exploitation and exploration are the two extremes of a continuum, where organizations can lie on either side of it or maintain a balance in the middle between exploitation and exploration. However, he also found that organizations that tend towards the exploitative side should invest in explorative activities, and organizations focused on the explorative side vice versa in order to maintain a balanced optimum. Both abilities are opposed to each other, depending on the given preset.

Moreover, when considering exploitation and exploration, which can contradict each other over time, exploration creates new opportunities designed to assure the long-term survival of an organization, while exploitation aims for current income that in turn allows it to invest in exploration (Rothaermel & Deeds, 2004). There has also been evidence showing that exploration and exploitation can create positive spill-over effects on each other, when interacting and fertilizing each other with knowledge and expertise (Katila & Ahuja, 2002; Knott, 2002).

There has been an ongoing debate whether or not and how exploitation can exist next to exploration, whether both exploitative and explorative activities are complementary or contradictory, and whether or not companies should try to focus on either one of them or balance both, and which possible solutions might master that challenge (Gupta, Smith, & Shalley, 2006; Raisch et al., 2009). Exploration versus exploitation has also been studied under a variety of literature as stated by Lavie, Stettner, & Tushman (2010, p.112):

“The notion of exploration–exploitation has been studied in a wide variety of literatures such as organizational learning (e.g., Levinthal & March, 1993; March, 1991), organizational design (e.g., Tushman & O’Reilly, 1996), knowledge management (e.g., Brown & Duguid, 2001), and adaptation (e.g., Eisenhardt & Brown, 1997). These concepts have been employed in various contexts such as technology development and product innovation (e.g., Danneels, 2002; Greve, 2007; He & Wong, 2004; Tushman, Smith, Wood, Westerman, & O’Reilly, 2003), strategic alliances (e.g., Beckman, Haunschild, & Phillips, 2004; Koza & Lewin, 1998; Lavie & Rosenkopf, 2006; Rothaermel, 2001; Rothaermel & Deeds, 2004), and senior-management teams (e.g., Beckman, 2006; McGrath, 2001). Furthermore, the notions of exploration and exploitation have been investigated at various levels of analysis, generating research at the individual (e.g., Mom, Van den Bosch, & Volberda, 2007), group (e.g., Beckman, 2006; McGrath, 2001), organizational (e.g., Benner & Tushman, 2002; Greve, 2007; Harrell, O’Reilly, & Tushman, 2007; Jansen, Van Den Bosch, & Volberda, 2006), inter-organizational (e.g., Lavie & Rosenkopf, 2006; Lin, Yang, & Demirkan, 2007; Rothaermel, 2001; Vassolo, Anand, & Folta, 2004), and industry levels (e.g., Gilsing & Nooteboom, 2006).”

In the pursuit of a balance between exploration and exploitation, the concept of organizational ambidexterity arises.

Being ambidextrous as an organization means being both-handedly skilled, not unlike being able to do something with the right hand while at the same time doing something different with the left hand (i.e. handling a recurring activity like everyday business with the left hand, while developing a non-recurring activity like developing a new product with the right hand). When talking about organizational ambidexterity, we refer to an organization that is skilled in

managing day-to-day business efficiently, while still being agile enough to react and develop the business of tomorrow (Duncan, 1976; Gibson & Birkinshaw, 2004). According to the definition of Raisch and Birkinshaw (2008), which is very similar, organizational ambidexterity is “an organization’s ability to be aligned and efficient in its management of today’s business demands while simultaneously being adaptive to changes in the environment” (Raisch, 2008, p.504). This basically means that a company that fulfills the requirements of being ambidextrous is able to have stable processes and a stable structure with constant high-quality output, while it has, at the same time, the ability to be very flexible and innovative, which demands other organizational prerequisites. Organizational ambidexterity was also found to be very hard to pursue as an organization, since it needs a balancing act between being exploitative and explorative at the same time (Birkinshaw & Gibson, 2004).

Different studies identified several organizational, but also individual factors that can be associated with the implementation of organizational ambidexterity (Jansen et al., 2006; Mom et al., 2007).

Moreover, companies that are able to establish and handle ambidexterity within their organizations are found to have not only higher sales growth (He & Wong, 2004; Venkatraman, Lee, & Iyer, 2006), be better prepared for the future with the capital at hand (Cottrell, Nault, & Barrie, 2004), but also be more effective participants in the market. However, organizational ambidexterity needs to reach a certain balance between efficiency and adaptability, so that a company is not risking to only innovate without earning money through exploitation nor being very efficient without assuring future earnings through exploration. Still, organizational ambidexterity might not always be desirable or needed in the first place, since a focus on either exploitation or exploration might dominate under certain circumstances (Gulati & Puranam, 2009).

Duncan (1976) was first to suggest dual structures for organizations in order to support their innovation activities. These dual structures should establish a border between everyday business and more innovative activities. This connects with the concept of ambidextrous organizations. Tushman and O’Reilly (1996) and later O’Reilly and Tushman (2004) further developed the frame of ambidextrous organizations by suggesting that ambidextrous organizations can manage evolutionary and revolutionary changes through differentiated organizational architectures. Ambidextrous organizations have inherently competing objectives

within the same organization, and both need to be pursued. This requires a differentiated structuring and management of the activities addressed by each objective (Gulati & Puranam, 2009; Smith & Lewis, 2011). Simsek (2009, p.597) states that: "An ambidextrous organization maintains a high degree of balance between exploitation (learning via local search, experiential refinement, and reuse of existing knowledge) and exploration (learning gained through processes of concerted variation, planned experimentation, and play)". Such a balancing act also contains a form of moderation, swerving at specific times a little more to one side, (i.e. investing more in exploitation) and in other times to the other side (i.e. developing a costly new product and therefore investing more in exploration).

There are basically three solutions for becoming an ambidextrous organization, as will be described in more detail in the section 2.3.3 (Types of Organizational Ambidexterity). One solution is structural ambidexterity, which implies the separation of exploitation and exploration within the organization (Lawrence & Lorsch, 1967) to cover paradoxical demands (Gilbert, 2005). In that solution, formal and informal integration mechanisms should be used to assure the flow of knowledge across exploitative and explorative units (Gilbert, 2006; Westerman, McFarlan, & Iansiti, 2006). The second solution is to be contextually ambidextrous as an organization, or as the individuals working within it, depending on the current need (Adler et al., 1999; Raisch & Birkinshaw, 2008). The last solution is to be an ambidextrous organization through leadership, where the leaders guide the organization through the cycles of exploitation and exploration (Raisch & Birkinshaw, 2008). To summarize, in order to become an ambidextrous organization, companies need to deal with the paradox of managing contradictory objectives that each "hand" (i.e. explorative versus exploitative) is pursuing at the same time within the same company, together with the different cultures that come with them (Smith & Tushman, 2005). Research has shown that ambidextrous organizations can outperform firms that focus on either exploitation or exploration (He & Wong, 2004; Lubatkin et al., 2006).

2.3.2. Topics relating to organizational ambidexterity

The concept of organizational ambidexterity is also related to other topics, which should be addressed in the following.

2.3.2.1 *Organizational Learning*

Organizational ambidexterity is a relevant topic studied within the field of organizational learning (Levinthal & March, 1993). There has been a recent debate in organizational learning literature about how exploitation and exploration activities are related to learning. March (1991) distinguishes between the degree of learning that happens within exploration activities versus the learning that happens within exploitation activities. March's approach was further developed by other authors who define exploitation as the experiential refinement and reuse of existing routines and exploration as planned experimentation and play (Benner & Tushman, 2003; He & Wong, 2004; Gupta et al., 2006). Both learning types, the one associated with experiments and therefore closely interlinked with exploration, and the one associated with the refinement and reuse of existing routines and closely interlinked with exploitation, are essential for successful companies in the long term (Levinthal & March, 1993; Gupta et al., 2006). Moreover, learning from individuals and from each other is important for creating knowledge, and the more knowledge becomes architectural knowledge, a knowledge that combines both learning types, the better the many, often contradictory requirements are met (Iansiti & Clark, 1994).

Organizational learning also depends on the organization's absorptive capacity (Cohen & Levinthal, 1990). Organizational learning can be achieved when absorbing and exploiting knowledge that is deriving from company's internal sources or external sources. However, for effective organizational learning, both sources should be tapped in balance, according to Cohen and Levinthal. If an organization is only learning from internal sources, it might be driven out of the market because of lacking access to meaningful knowledge or a specific technology. Otherwise, if an organization is limited to learning from external sources, it runs the risk of not achieving incremental improvements in the established operations and processes, which can again harm the wellbeing of the organization. Organizational learning was also found to be closely interlinked with the organization's knowledge stock, which can be a source of a competitive advantage (Cohen & Levinthal, 1990; Helfat, 1997), and also with the organization's capacity for knowledge creation (Nonaka & Takeuchi, 1995). Organizational learning depends on the ability of the individuals within it to acquire knowledge (Argyris & Schon, 1978).

Knowledge and the ways to gain it are closely related to connections with external communities outside the organization (von Hippel, 1988). Internal connections and access to organizational knowledge represent another key ingredient in achieving ambidexterity, while the

sharing of knowledge is closely interlinked with the values and norms that a company has (Benner & Tushman, 2003) According to Mom, van den Bosch, and Volberda (2009), receiving knowledge from internal players that are higher up in the hierarchy is positively related to exploitation, whereas knowledge from players that are lower or at the same level in the hierarchy is also positively related, but to exploration. The gaining of knowledge is depends on knowledge sharing between individuals (Gulati, Puranam, & Tushman, 2012). Informal relationships facilitate access to knowledge, which is the reason why social and informal relationships are also said to reduce or, in other instances, create barriers to learning (von Kutzschenbach, 2006). Organizational learning therefore depends considerably on exchanges in informal groups and their clique networks, as such informal groups or cliques are distinctly autonomous and dependent on what, as knowledge, enters their network and is accordingly spread within it (Putman, 1993). Members of such clique networks are said to have similar viewpoints and similar attitudes, which reduces the risk of not trusting each other, enabling and facilitating the sharing of complex knowledge (Hansen, 1999). At the same time, it is very difficult to bring something new (e.g. new knowledge or the acceptance of a new technology) into such cliques, since they are bound to their existing norms and values (von Kutzschenbach, 2006).

Furthermore, organizational learning and its interdependency with organizational ambidexterity has also been analyzed by Lackner et al. (2011), who found that different learning architectures can support ambidexterity through the application of specific HRM practices. Finally, the capacity to learn as an organization and therefore transform individual learning into organizational learning also plays a crucial role in High Reliability Organizations, where a lack of such a capacity might have fatal consequences (Weick & Sutcliffe, 2007).

2.3.2.2 *Technological Innovation*

Another topic within the literature on organizational ambidexterity is technological innovation (Raisch & Birkinshaw, 2008), as organizational ambidexterity has been recognized as an important topic in this area as well (Tushman & O'Reilly, 1996; He & Wong, 2004). Since this topic has already been thoroughly explored above in the chapter "Innovation: An overview", only its relation to organizational ambidexterity is treated here.

Mostly, radical innovation is associated with exploration and incremental innovation with exploitation (Tushman & Smith, 2002). According to several authors, tensions need to be balanced when applying both radical and incremental innovation (Abernathy & Utterback, 1978). Along these lines, successful ambidextrous organizations need to be able to simultaneously pursue radical and incremental innovation (Tushman & O'Reilly, 1996).

An implementation of a technological innovation within products or services, be it radical or incremental, suggests a project-based approach, according to Leybourne & Sainter (2012). The project approach suits today's corporate needs, because it considers the increased turbulence in the organizational environment as well as fast moving market sectors (Cooke-Davies, Cicmil, Crawford, & Richardson, 2007). In any case, project management techniques are said to become more popular, especially on the explorative side within the ambiguous and complex circumstances that prevail in most businesses today (Thomas & Mengel, 2008).

Technological innovation is also closely associated with experimentation and improvisation (Leybourne & Sadler-Smith, 2006), as project management assist such endeavors appropriately. Nevertheless, complex technological innovation projects depend considerably on senior management's willingness to invest into uncertain, maybe slow-to-pay-off projects and free the amount of resources needed (Danneels, 2002), which is a major challenge in orchestrating assets.

When technological innovations differ more from existing technology or the core business a business unit pursues, the innovation and the team in charge of its implementation should be spun out into a structurally separated entity (Hill & Rothaermel, 2003). If the technology can be leveraged within the business unit (i.e. that parameters stay the same, only the technology changes), contextual ambidextrous designs appear more effective (Tushman et al., 2010).

2.3.2.3 *Organizational Adaption*

Several researchers link the long-term success of organizations with their ability to balance exploitation and exploration (Miller & Friesen, 1984; Tushman & Romanelli, 1985; Probst & Raisch, 2005). In general, organizations usually undergo long periods of exploitation and

incremental innovation and relatively short disruptive times, where exploration with radical innovation is dominant (Tushman & Romanelli, 1985). In such dynamic and disruptive moments, an organization has to be able to immediately adapt how it gathers information (Sidhu, Volberda, & Commandeur, 2004) in order to process the information correctly (Miller & Friesen, 1983) and make sustainable decisions regarding the disruptive event. Organizations that try to be adaptive and improve the chance to survive in the long term, need to develop the right skills for both periods (Tushman & O'Reilly, 1996).

Organizational identity also plays a role when an organization is adapting and experiences the forces of inertia (Dutton & Dukerich, 1991). Top management is expected to lead, manage, and mediate between eras of convergence and eras of discontinuity (Tushman & Romanelli, 1985), while middle management is expected to moderate the eras of convergence and mainly manage incremental change. The organizational transformation model (OTM) by Lukas et al. (2016) identifies five elements for more sustained organizational adaptations. These are the impetus to transform, the leadership's commitment to quality, improvement initiatives with actively engaged staff, alignment in order to achieve consistent organization-wide goals, and integration and engagement to overcome organizational boundaries (Lukas et al., 2016). He furthermore found that middle managers play a catalyst role when engaged and actively involved in improvement processes. Moreover, the survival of organizations in stable environments is more likely when exploiting existing business, whereas the survival in unstable and turbulent environments is better achieved by being able to adapt and abandon certainties and explore instead (Hannan & Freeman, 1984).

With regard to the structural organizational adaptation, explorative activities transform over time into exploitative activities, and companies adapt their organizational structures in order to fit the requirements of each period (Brunner et al., 2010).

2.3.2.4 *Strategy*

Organizational ambidexterity is also related to certain strategic issues (Smith & Tushman, 2005; Lubatkin, Simsek, Ling, & Veiga, 2006; Jansen et al., 2008). Deciding upon a strategic direction for organizations becomes specifically challenging for senior management within ambidextrous organizations, because of their units' divergent focal points (Jansen et al., 2008). Teece (2006)

suggests that the skills needed to identify and develop exploration are not the same as the ones needed to make profit from exploitation. When looking at strategies within ambidextrous organizations, these can be allocated to exploitation and exploration (Burgelman, 2002). Organizations need to have an operational strategy for exploitation and another one for exploration (Hamel & Prahalad, 1993) which implies that they can never fully optimize either option (Burgelman, 1991). Burgelman (1991) states that a pursuit of both strategic processes is the most beneficial in the long term, since new capabilities eventually also need to be refined. Some scholars even go further and define the ability to exploit existing skills while exploring new ones as a key strategic challenge (Hamel & Prahalad, 1993). Concluding this aspect, difficulties arise when two different strategies and therefore two different alignments need to be managed (Gupta et al., 2006). Managing two different internal architectures, one for exploitation and another for exploration, requires an overarching strategy which is based on the corporate core values in order to finally reconcile the divergent units or players (O'Reilly & Tushman, 2007). Another issue is the management of paradoxes at different levels within an organization (Andriopoulos & Lewis, 2009), which call for strategic guidance and pursue different goals at the same time (Ethiraj & Levinthal, 2009). Companies pursuing multiple performance goals (i.e. exploitative and explorative ones) are prone to experience a lock-in in the status quo. However, that threat can be mitigated by posing strategic goals for the employees (Ethiraj & Levinthal, 2009) and translating ambiguous and conflicting expectations within exploitative and explorative units into smart and achievable strategies (Jansen, Tempelaar, van den Bosch, & Volberda, 2009). According to Teece (2007), such challenge can be mitigated by delivering overarching integrative and synergetic values that are applicable within exploitative and explorative units at the same time.

2.3.2.5 *Organizational Design*

Organizational design is a topic widely discussed by scholars because of the paradoxes of either organizing for effectiveness or organizing for flexibility (Thompson, 1967). Mintzberg (1989) wrote about organizations and their structures:

“Every organized human activity - from the making of pottery to the placing of man on the moon - gives rise to two fundamental and opposing requirements: The division of labor into various tasks to be performed and the coordination of those tasks to

accomplish the activity. The structure of an organization can be defined simply as the total of the ways in which its labor is divided into distinct tasks and then coordination achieved among those tasks.” (p.100-101).

Lawrence and Lorsch (1967) put it very similarly, but included individual goals. They suggested that an organization should solve two basically interlinked problems, the division of labor and the integration of effort, while also defining appropriate goals for each organizational unit. Organizations, including ambidextrous organizations, should allow for meaningful decision making in order to reduce complexity in their activities. Higher tiers within the organization should be responsible for coordination and decision making and for keeping oversight, while lower tiers engage more in specific operationally oriented task (Gulati et al., 2012). However, the right choice about how to define the organizational design always depends on several aspects regarding internal and external factors (Carroll, 2012). Moreover, an organizational design has to consider and allow for systematical interaction between units, departments, and individuals, be it vertically to allocate resources and obtain support, or simply to share information and coordinate actions horizontally (Dutton & Ashford, 1993; Jansen, Simsek, & Cao, 2012). There can be structural solutions, which enable such information sharing and linking. Also, organizational linkages are affecting the adoption and implementation of new technologies (Tripsas & Gavetti, 2000).

Regarding the different orientations within ambidextrous organizations, Jansen et al. (2012, p.1287) said:

“An ambidextrous unit can create and capture additional value by combining insights, information, and input from other units, but opportunities for such a productive exchange likely decrease as differentiation goes up. Not only does differentiation complicate inter-unit exchanges by giving rise to differences in structures, systems, and processes across units but it also heightens the salience of parochial goals and interest—all of which can detract from ambidextrous units’ ability to realize synergies between exploratory and exploitative activities for more performance gains.”

Therefore, the sharing of resources and also knowledge through interdependency affects ambidexterity and performance (Hage & Aiken, 1970; Tushman & Nadler, 1978). On the other hand, mechanistic and centralized structures are said to support efficiency, while organic,

decentralized structures support flexibility (Burns & Stalker, 1961). Differentiated and decentralized units and teams are said to be able to adapt faster to new environments and enable exploration (Benner & Tushman, 2003). However, decentralized structures also need a certain formalism and, to some extent, close connections in order to facilitate exploitation (Jansen, van den Bosch, & Volberda, 2005). There are solutions that allow companies to combine these two controversial structures (Adler, Goldoftas, & Levine, 1999; Jansen et al., 2005) (i.e. mechanistic versus organic), as is the case with the hypertext organization (Nonaka & Takeuchi, 1995). It is also this type of structural combination that supports ambidexterity by allowing a combination of exploration and exploitation.

Having mainly discussed the internal organization, there are, of course, also important external boundaries. In terms of external links and boundaries, an organization has to master the axiom of opening its boundaries to allow for knowledge to be sourced from other companies and industries, but at the same time have its boundaries well-defined in order to maintain the existing culture and the collective sense of identification with the corporation (Gulati et al., 2012).

To conclude this tour of topics relating to organizational ambidexterity, it must be pointed out that this thesis is mainly focused on the domain of technological innovation (Abernathy & Clark, 1985), with an eye on organizational adaptation (Tushman & Romanelli, 1985) and organizational design (Thompson, 1967).

2.3.3. Types of Organizational Ambidexterity

There are several organizational solutions that enable ambidexterity in organizations. Companies can also simply avoid such a dilemma by sourcing out either the exploitative or explorative part to other companies (Holmqvist, 2004). Siggelkow & Levinthal (2003) argue that another possible solution would be to either explore or exploit, separated on the time axis. This would mean inventing a product for a given time and later on producing and selling it with the same team. This was also defined as chronological, sequential, or punctuated separation (Tushman & Romanelli, 1985; Anderson & Tushman, 1990; Burgelman, 2002; Siggelkow & Levinthal, 2003; Lavie & Rosenkopf, 2006). Such a solution, or the choice of staying explorative or exploitative for the whole of the organization's existence (Lavie & Rosenkopf, 2006), is not considered a viable option, since organizations, especially HROs, need to be able to pursue their everyday

business, like providing international air traffic control for a certain country, even for aircraft that do not even plan to land there, but only pass through its airspace or maintaining an ambulance service that can never know when the next accident will happen. These organizations need also to innovate at the same time, while maintaining their critical routine business. The special challenge in this setting is to bring both philosophies and both strategies under one roof (Benner & Tushman, 2003; Gupta et al., 2006) or, rather, to inject innovation and its philosophy into a rigid culture, where the vast majority of people only works by the book and does not embrace innovation.

The main three organizational existing solutions for organizational ambidexterity are structural separation of exploitative and explorative units within the organization (i.e. structural ambidexterity), contextual ambidexterity, which refers to an organization in which units or individuals are either explorative or exploitative (i.e. explorative and exploitative units or individuals are not structurally separated), and lastly leadership ambidexterity, with which an organization is being led through the cycles of exploitation and exploration (Raisch & Birkinshaw, 2008). Structural ambidexterity is mostly associated with starting a new business within a company, which allows it to create completely new platforms (Raisch, 2008). According to this author, contextual ambidexterity is mainly used in small organizations and in parallel or project structures in order to improve existing products or services. Another ambidextrous structure mentioned by Raisch (2008) is chronological separation between explorative and exploitative units, which is said to be used mainly in major reorganizations of companies, when an old field has to be left behind completely, mainly due to changing environmental conditions. In any case, one major challenge is not only how to solve the intrinsic dilemma of ambidextrous organizations, but, above all, how to design the process for integrating the two type of activities or differentiated initiatives (i.e. explorative and exploitative) in a value enhancing manner (Jansen et al., 2009). This is mostly because there are other benefits and synergies when companies manage to directly establish interdependencies between the two states of either exploiting or exploring (Floyd & Lane, 2000). Moreover, the organizational solution is also strongly dependent on the context of the organization in question, like its industry, geography, competition, etc. (Raisch, 2008).

2.3.3.1 *Structural ambidexterity*

Regarding organizational ambidexterity, there are several ways of becoming ambidextrous. One dominant ambidextrous structure is structural or spatial separation of explorative units from exploitative units in order to support an explorative environment and its culture alongside an exploitative culture (Tushman & O'Reilly, 1996; Raisch & Birkinshaw, 2008).

A definition of structural ambidexterity is proposed by Benner and Tushman (2003, p.252): "Ambidextrous organization designs are composed of highly differentiated but weakly integrated subunits. While the explorative units are small and decentralized, with loose cultures and processes, the exploitation units are larger and more centralized, with tight cultures and processes". He refers to a standard organization that usually employs a large workforce producing products or delivering services, while only a few professionals occupy themselves with the development of new products and services (Tushman & O'Reilly, 1996; Benner & Tushman, 2003).

Structural separation usually goes along with chronological separation between the time of explorative activities and the time of exploitative ones, which would be considered reciprocal (sequential and interdependent) according to the model of Simsek, Heavey, Veiga, and Souder (2009). The reason why a structural separation usually goes together with the chronological one is because once the exploration activity is over, the activity is usually reintegrated into the exploitative structure of the organization. Chronological separation usually only affects internal operational units and not market-oriented business units, since front-end contacts with customers cannot be changed in order to maintain reliable customer processes (Raisch, 2008). Usually, units or teams are separate for the company's infancy, e.g. in an incubator environment, in which the explorative activity is better supported than within existing structures and bureaucratic decision channels. Later, the transition back into the exploitative structure has to be managed accordingly, disregarding environmental conditions (Siggelkow & Levinthal, 2003). There are also other possible ways for exploitative and explorative units to be separated, but still combined in complex structures (Adler & Borys, 1996).

The basic notion of structural separation is that units are defined as specifically explorative or exploitative and organized accordingly (Duncan, 1976). Such a solution is neat and simple, because it allows each unit to develop the required culture and establish the most

efficient processes (Lawrence & Lorsch, 1967). Structural separation usually implies a physical separation in the form of dedicated offices, buildings, or maybe even a separate geographical locations. An extreme would be when a new business opportunity that has nothing to do with existing capabilities or resources, which would be logically separated and have nothing in common with the existing business (O'Reilly & Tushman, 2007). The question of how much such a structurally separate explorative unit can remain close to the exploitative unit depends on various factors. It has been found that some linking mechanisms between exploitative and explorative units and teams need to be in place, as the exploitative units' capabilities could not be leveraged otherwise (Siggelkow & Rivkin, 2006).

Some scholars argue that the explorative units should be kept separate from the exploitative ones in order to develop a more entrepreneurial spirit and the creative environment needed to develop new products, processes, and services (Weick, 1976). Other suggestions propose loosely coupled units, where explorative activities are differently led by management in order to build up their own culture, style, and way of working, but still pertain to the same organization and act under the same roof (Tushman & O'Reilly, 1996; O'Reilly & Tushman, 2004). Other proposals offer solutions that are highly inconsistent with the organizational architecture they are located in (Bradach, 1997), for example, an explorative unit that is allocated within an exploitative business unit, but can benefit from a rich learning context (Sutcliffe, Sitkin, & Browning, 2000; Ethiraj & Levinthal, 2009). Integration across organizational units would capture the benefits and advantages of getting different specialists together (Helfat & Peteraf, 2003), as knowledge can be shared and new ideas generated.

Another quasi-structural separation is the so-called parallel structure, which places another structure next to the structure of the exploitative workforce, such as a project structure that is dedicated to innovation (Goldstein, 1985). Such structuring of an organization allows the workforce to stay within the same unit or team, since they can change from one to the other structure (Birkinshaw & Gibson, 2004), for example, from the exploitative structure to the project structure where they support the implementation of an innovation with their expertise and then go back, for example, after a meeting. Such organizational solutions are similar to the hypertext organization (Nonaka & Takeuchi, 1995) which suggests the same two "layers", next to another knowledge layer, in order to maintain knowledge for the future. According to Tushman & O'Reilly (1996), structural ambidexterity allows companies to be efficient in their

everyday business, which means being efficient today, but also keeping innovative capacities to ensure long-term adaptability.

2.3.3.2 *Contextual ambidexterity*

Several studies offer solutions to the organizational paradox of being efficient and flexible at the same time. This can imply structural ambidexterity as explained above, or contextual ambidexterity (Raisch & Birkinshaw, 2008). Birkinshaw and Gibson (2004, p.49) define contextual ambidexterity as follows: “contextual ambidexterity ... calls for individual employees, at any hierarchical level (Lavie et al. 2010), to make choices between alignment-oriented and adaptation-oriented activities in the context of their day-to-day work”. According to Birkinshaw and Gibson, contextual ambidexterity exists more on the frontline, instead of at the top of the organization, as in structural ambidexterity, since the frontline workers have to make the decisions on how to act in a certain situation, which can create conflicts (Smith & Tushman, 2005). In order to achieve contextual ambidexterity, it is therefore required for employees to remain flexible, instead of following clear protocol, while also demanding rather generalist skills, instead of specialist skills, as was the case in structural ambidexterity.

The basic principle of contextual ambidexterity is that employees are defined as exploitative by principle, but expected to switch mentally to being explorative when the situation demands it. Thus, personal mental partitioning is required by the workforce (Gupta et al., 2006; Simsek et al. 2009). This needs managers to be consistently inconsistent, depending on the situation (O’Reilly & Tushman, 2007), e.g. consistently following the rules and deciding accordingly, while being able to make adaptation-oriented and not by-the-book decisions when needed. Such a situation can be, for example, choosing the right investment, making the right decision trying to leave a stable approach behind and, at the same time, opening one’s mind and trying to be creative with an attitude that leaves outcomes open and without 100% certainty.

In contextual ambidexterity, leadership is more essential than in other organizational solutions, since it is the leader who is in the driver seat, trying to steer employees to select the exploitative or explorative approach in a given situation (Raisch & Birkinshaw, 2008). Possible measures for top management and the human resources department for facilitating contextual ambidexterity can include job enrichments with equivalent incentives (Adler et al., 1999b), the

possible outlook to not only exploit but also explore and the creation of a shared vision in order to keep behaviors and decisions aligned (Bartlett & Ghoshal, 1989). However, it is very challenging to be successful with contextual ambidexterity, since it demands strong leadership. Birkinshaw and Gibson (2004) suggests that managers maintain balanced leadership, where trust leaves room for innovation, combined with discipline in order to deliver 100% quality in everyday work. In the same vein, Ghoshal and Bartlett (1997) argue that contextual ambidexterity can be achieved with performance management with stretch targets and enforced discipline. According to them, this allows managers to motivate the workforce to deliver high quality output while making people feel personally responsible. Moreover, social support is needed, which is achieved by giving support and trust to the workforce that gives them the needed security to perform. Hambrick (1994) describes such dual behavioral integration as socially oriented and task-oriented processes that are led by the top management. Another essential need for contextual ambidexterity is a leader with a distinguished repertoire who can handle such demanding and often ambiguous environments (Denison, Hooijberg, & Quinn, 1995). Finally, by force of having to act either explorationally or exploitationally, contextual ambidexterity tends to be pursued by small to medium-size companies (Lubatkin et al., 2006).

2.3.3.3 *Leadership ambidexterity*

Plain leadership is necessary for structural ambidexterity and, according to different studies, especially for contextual ambidexterity. Leaders are considered to be linchpins, the mediating role, when an organization maintains ambidexterity or in pursuit of ambiguous goals (Tushman & O'Reilly, 1996; Birkinshaw & Gibson, 2004). Leadership ambidexterity or top management team ambidexterity (Smith & Tushman, 2005) has evolved over the last years as an object of study, where before only structural and contextual ambidexterity were regarded as the primary alternatives for organizational ambidexterity. It has since emancipated itself as a stream within ambidexterity research in its own rights (Lubatkin et al., 2006). This mainly considers aspects of leaders who, depending on different hierarchical levels, assume different functions of either explorative or exploitative nature. According to this approach, leaders can divide their behavioral focus and be either explorative or exploitative, depending on the needs of the situation and, in particular, of the organizational unit they are working with at a specific moment (Smith, 2006). Leaders therefore have to actively create meaning from the contradictions and the different agendas of exploitation and exploration and manage that paradox (Thompson, 1967; Weick,

1979). Top management also has to define different goals for exploitative and explorative activities and manage progress towards them with all the paradoxical consequences (Smith & Tushman, 2005).

Leadership ambidexterity is considered necessary, but not sufficient as a stand-alone solution when hosting innovation initiatives (Tushman et al., 2010). A mix of well-established players in a company combined with “fresh blood” can achieve the best results in being ambidextrous according to several studies (Beckman, 2006; Perretti & Negro, 2006). The leaders should therefore assemble a diverse and heterogeneous team with different capabilities. It also seems the leader’s task to assure the proper flow of information between different teams and effective decision making (Lubatkin et al., 2006). In order to lead ambidexterity effectively, leaders need to establish trust within the workforce, so that the team follows and believes the chosen path (Adler & Heckscher, 2013).

Research on how leaders affect the implementation of innovations mainly focuses on top management, whereas the middle management and its influence has been neglected so far (Engle, Lopez, Chan, & Charns, 2016). However, middle managers play a crucial role when implementing innovations (Engle et al., 2016) by creating a bridge between the top management and its actions and the team leaders and the operational level. Supporting activities of the middle management can include holding meetings to spread information to educate staff, demonstrating the hand-on use of an innovation, and providing guidance concerning the application of an innovation. This can promote the buy-in of the workforce, as was found in the healthcare industry (Engle et al., 2016), which is also considered an HRO environment. These authors furthermore state that middle managers anchored improvements in individual goals and held players accountable for tasks in the innovation’s implementation (Engle et al., 2016). According to Birken, Lee, and Weiner (2012), the middle managers’ role is five-fold when it comes to facilitating innovation. They need to state their commitment to an innovation, diffuse information and knowledge, synthesize information in order to make innovations and technologies understandable, mediate between strategy and daily business, and promote the innovation implementation within the workforce. Communication was also found to be important in successful cases where informal, but clear, direct, and transparent communication channels were used (Engle et al., 2016).

An ambidextrous form of this nature, i.e. leadership ambidexterity, creates a special challenge for the leaders or the senior team, since the accountable person or team has to handle the arising contradictions regarding exploration and exploitation, which usually depends on the situation and the different learning modes (Smith & Tushman, 2005). Moreover, several authors state that while ambidexterity can be structural, contextual, or related to leadership, in the end, leadership is most important to accomplish ambidexterity (O'Reilly & Tushman, 2007). It can potentially be most challenging too, considering the different roles leaders have to play and represent, while structural and contextual would not work properly without intensive leadership either (Lynch, 2007).

This research focuses mainly on two types of ambidexterity, that is, structural ambidexterity and contextual ambidexterity. However, at a certain level in the hierarchy, no matter whether structural or contextual ambidexterity is applied, leadership ambidexterity always comes into play, since, in the end, there will be one person who has to orchestrate both sides of ambidexterity.

2.3.4. Moderators and outcomes of ambidexterity

2.3.4.1 *Environmental factors as moderators*

The environment and the industry in which an organization is active directly influences the organization's actions and the appropriate balance between exploitation and exploration (Lavie & Rosenkopf, 2006; Venkatraman, Lee, & Iyer, 2006). The environment considered in this research project is strongly influenced by safety and the HRO concept, as already explained above. Companies in an HRO environment build up very strong cultures of shared beliefs and conduct. However, strong cultures can get organizations to stick to the realm of what is known by them (i.e. exploiting existing businesses) at the cost of not engaging in any exploration (Sorenson, 2002). Next to culture, the organization and its identity also communicates a certain understanding regarding its mission and goals to its members (Miles & Snow, 1978; Tripsas, 2009). In HRO environments, the mission and sometimes the specific goals as well demand behavior that implies not being creative not innovative, but stable above all else.

When considering a company in a very innovative field with short product lifecycles, a major part of the workforce needs to explore and bring such an explorative mindset to work. By contrast, in a business environment such as an HRO environment, products usually have a lifecycle of several decades, and exposure to innovation is rare and the resilience of the organizations is high, for the simple reason that it has to be. HROs are preoccupied with failure and need to manage the unexpected, as stated by Weick and Sutcliffe (2007). According to them, such organizations need resilience as a skill, which is an “intrinsic ability of an organization to maintain or regain a dynamically stable state, which allows it to continue operations after a major mishap and /or in the presence of a continuous stress” (Weick & Sutcliffe, 2007, p.14). Within HROs, it is also known that rigid hierarchies are vulnerable to errors and that operational decision are being made at the frontlines where the operational expertise is allocated, regardless of people’s rank (Weick & Sutcliffe, 2007). Because of the nature of HROs and their environment, the majority of the workforce tends to pursue exploitative jobs, while maybe incrementally improving existing technologies, rather than revolutionizing them.

In such slow-moving industries, the environment and the competition also have a direct influence on the ambidexterity of an organization, as was found by several researchers (Levinthal & March, 1993; Volberda, 1998). Among environmental factors, one can distinguish between environmental dynamism, which is influencing organizations and their degree of possible ambidexterity, and competitive dynamics, which means the influence the competition has on an organization and its required ambidexterity. Auh and Menguc (2005) state that companies will try to find the right balance of ambidexterity when faced with environmental competition.

Organizations that participate in an open market are sooner or later forced to establish ambidextrous structures in some form (Levinthal & March, 1993). The more intense the competition, the more it forces organizations to be explorative as well as exploitative, in particular in the sense of becoming ambidextrous (Jansen et al., 2005). Moreover, the more pressure from the market, the more likely a company is to take risks with novelty products that could also lead to hazardous outcomes for a company if they are not successful in the market (Miller & Friesen, 1983). If the opposite is the case, if there are no opportunities for competitive change in an industry or a business, because of its inherent character, the need for exploration is not so high.

2.3.4.2 *Other moderators*

Next to environmental factors, there are several other factors that are moderating the organizational ambidexterity of organizations. A special moderator that can be a fertilizer of ambidexterity is collaborative trust (Adler & Heckscher, 2013), which is based on an institutionalized dialogue and a shared purpose. The building up of trust, however, can take lots of time, while abusing perceived trust can destroy it fast. When leading through paradoxical times, i.e. when having to combine an as yet unstable innovation with stable, bulletproof processes, sense making communication from management was also found to be extremely important in order to not paralyze the affected organization (Jay, 2013).

Another moderator is the pertinent market orientation of the organization (Kyriakopoulos & Moorman, 2004). Orienting and aligning the organization according to the customers' needs provides key momentum for exploiting current products (i.e. improving incrementally the product, production facilities, and maybe processes), while it is also important to orientate the organization towards the customer's needs in terms of exploring new products, processes, and potentially business models.

Another moderator of ambidexterity is the available resources (Raisch & Birkinshaw, 2008). Large companies with enough financial and personal resources can more likely follow exploitative as well as explorative paths in order to capture both strategic goals, i.e. to be innovative (explorative side) and efficient (exploitative side) (Kyriakopoulos & Moorman, 2004), while small firms more often than not do not have access to those resources (Lubatkin et al., 2006). Small companies are therefore found to be better off when pursuing either exploration or exploitation at one time (Ebben & Johnson, 2005; Lubatkin et al., 2006). Yet another moderator is risk averseness (Pinto, 2016). In the case of HROs, the consequences of taking high risks can be severe, and finding an explorative culture within such organizations is difficult, since they are usually trained to be anything but innovative.

2.3.4.3 *Performance outcomes*

The performance of an organization or of one of its units is contingent on the organizational context in which it operates (Brown & Eisenhardt, 1997). Pursuing both exploitation and exploration at the same time was found to harm consistency within a company, which can then lead to confusion within the workforce and undermine its results (Wernerfelt & Montgomery, 1988). However, March (1991) argues that a company that aims to be successful in the long term needs to be able to manage the paradox and organize both sides to accomplish organizational ambidexterity.

There are basically two traps into which an organization can fall, when it does not pursue organizational ambidexterity. One is the exploration trap, where an organization is innovating all the time while never reaching a status where it is reaping the rewards for its investment into knowledge, i.e. that a product, process, or service can be brought to the market and successfully sold (Levinthal & March, 1993). In the exploration trap, an organization is focused on developing something new and always goes for a new product, process, or service, while not investing enough in the current products and processes to make them really successful. The other trap is the exploitative or competence trap where an organization constantly spends time and effort on improving existing products, services, and processes for their immediate rewards, while forgetting or bypassing investments into new products, services, and processes due to the uncertain payback and slow return on investment (Levinthal & March, 1993).

Klarner & Raisch (2013) stated that a company has to find a healthy equilibrium between change and stabilization. When one or the other element persists for too long, it is not healthy and might lead the business into one of the mentioned traps and undermine financial results. On the other hand, organizations should exploit the core business in which they are successful and earn money with that, while at the same time invest a certain effort into developing new products, services, and maybe processes, without neglecting their core capabilities (Burgelman, 1991).

There are several studies regarding organizational ambidexterity in which most scholars correlate sales growth and performance positively to organizational ambidexterity, with different results in different settings and industries. He and Wong (2004) were the first researchers to find evidence that a balanced interaction of exploitation and exploration are positively associated

with sales growth and that an imbalance has the opposite effect in an analysis of 206 enterprises from the manufacturing sector. Gibson and Birkinshaw (2004) found that contextually ambidextrous organizations that can adapt dynamically to environmental changes have better performance in contrast to more rigid organizations. In the same vein, Lubatkin et al., (2006) also found that balanced ambidexterity correlates with growth and profitability.

2.4. Theoretical propositions

2.4.1. Theoretical propositions related to boundary activities and the interplay between exploration and exploitation activities

Organizational boundaries can be regarded as forming the social structure of an organization, in which a designated unit is responsible for a set of tasks, while others are responsible for other tasks that follow a certain shared logic (Kogut, 2000), or as demarcating power over resources (Helfat, 1997). For other authors, organizational boundaries end where the influence ends, even if this goes beyond the organization (Santos & Eisenhardt, 2005). In this study, the focus is on internal boundaries and, to be exact, on the boundaries between exploitative and explorative players. The demarcation line needs to run between two types of players that can also be structurally distinguished, except in the case of contextual ambidexterity. The boundaries pertain more to boundaries of identity (Santos & Eisenhardt, 2005), that is, to shared values and existing norms (Dutton & Dukerich, 1991; Elsbach & Kramer, 1996) separating two cultures. One culture is the very well established and strongly safety-conscious culture linked to exploitation, and the other is the culture of innovation and exploration. Ambidextrous organizations establish boundaries that are intentionally built and implemented through structural differentiation between explorative and exploitative units (O'Reilly & Tushman, 2007), which protect explorative activities from mainstream inertia (Carlile, 2004). These allow, according to O'Reilly and Tushman (2004, p.77), a “cross-fertilization among units while preventing cross-contamination”. In other words, structural separation creates formal boundaries within the company, which act like a buffer between the units. These boundaries can block influences from other units within the company to some extent.

Organizational members who are, in a sense, condemned to stay within one specific boundary engage in collective sense making (Weick, 1995) in order to learn and interpret new information about environmental changes, and they align and harmonize their responses to these changes. To some extent, organizational members are prone to stick to the group that is defined by their boundaries and set of beliefs, which is a state of affairs that is difficult to change.

Cross-fertilization across boundaries can occur with boundary activities, also known as organizational linkages. Boundary activities are, according to Taylor & Helfat (2009, p.721),

“those that connect actors with different job responsibilities in an organization, within or across units, through communication and coordination. Communication enables actors to obtain and share information; coordination enables actors to make aligned plans and decisions, and undertake consistent actions. Communication facilitates coordination, because sharing of information is required for alignment of decisions and actions.”

The coordination of explorative and exploitative units is an essential task in achieving ambidexterity (Smith & Tushman, 2005; Tushman & O’Reilly, 1996). Furthermore, according to O’Reilly and Tushman, (2007, p.17), “the crucial task here is not the simple organizational structural decision on which explorative and exploitative subunits are separated, but the processes by which these units are integrated in a value enhancing way.” There are two basic types of boundary activities associated with knowledge transfer that support organizational integration: formal boundary activities or cross-functional interfaces (Lawrence & Lorsch, 1967) and informal boundary activities, also known as social relations (Jansen et al., 2006; Tsai & Ghoshal, 1998). Jansen et al. (2009) have observed that informal social relations directly contribute to organizational ambidexterity. Known formal boundary activities between explorative and exploitative units are “sharing across boundaries” (Raisch & Tushman, 2011). These involve shared operational assets, such as shared back-offices or shared engineering services, joint market activities, such as cross-consulting of sales teams, and the transfer of best practices and skills when sharing personnel. Informal boundary activities, such as having daily advice calls among colleagues, spending lunch in the canteen together, or playing in the company’s soccer team together, are enabled by social networks. These social networks, which often span across hierarchical levels, are crucial for

coordinating multiple levels within a company as well (Pettigrew, 1990; Kleinbaum & Tushman, 2007; Taylor & Helfat, 2009). As employees, for example, discuss the latest news of a staff meeting concerning innovation in another unit or department while participating in non-formal boundary activities, they share knowledge, opinions, and awareness about current relevant topics at their company, such as new innovations. These individuals' social networks grow, as employees grow within a company. Employees leaving the company take the connections with them to some extent, which they might benefit from at their new employers as well.

Innovations in structurally differentiated units (i.e. structural ambidexterity) can be incremental or radical (Ettlie et al., 1984). Incremental innovations, such as improving a certain work process or installing more reliable quality controls, are usually implemented in exploitative units. Such innovations generally intend to improve existing technologies, products, processes, or services (Tushman, 2011). Radical innovations, such as new technologies, which can change a certain process as a whole, or which allow the introduction of totally new products, are usually the reason for explorative units to exist. This is mainly because established processes and current training levels often do not match the requirements for mastering a radical innovation (e.g. the new technology).

This might not be the case when sharing expertise about old technology. As an employee, be it a specialist or a manager, becomes an expert in his/her discipline over the years in a given position, his/her knowledge can become valuable to others (e.g. to explorative players). Thus, there can be situations in which, for example, an explorative player would need information about the use of old technologies in their daily application. Situations in which such knowledge is needed can arise before decisions about e.g. replacing technologies have to be made by employees. When decisions have to be made by explorative players about radical innovations or new technologies, e.g. whether to buy or otherwise acquire them, or to improve or reject an existing technology, decision makers need to build up a basis for such decisions. Therefore, explorative players solicit advice from the direct source of certain knowledge (Sorenson, Rivkin, & Fleming, 2006) or from holders of knowledge that is as close as possible to the topic in question, since the ability to assimilate complex knowledge depends directly on direct access to that knowledge (Nelson & Winter, 1982; Winter, 1995). Quite often, even when implementing a radical innovation, many of the specific aspects of the product or production process remain the same. This is the case, for instance, with aircraft manufacturers that no longer need to apply a corrosion-proof primer on aluminum surfaces before applying the final paint by using, as a form

of radical innovation, nanotechnology that allows the direct application of the final coating due to its corrosion-resistance. Even then, major quality specifications, such as thickness, heat resistance, etc. remain the same. One quality of radical innovations is that they are basically new to every player, even to some extent to the inventor itself. When explorative units have to form an opinion about a radical innovation and finally decide whether to take advantage of it, lots of input and knowledge can be gathered from existing exploitative units, where key exploitative players possess relevant knowledge. According to Evan (1966), organizational members working in a functional area tend to be experts in that area of expertise and become the most knowledgeable persons regarding problems, new ideas, and the suitability of new ideas in their functional domain. Thus, the know-how of exploitative players is mostly consulted by explorative units when it comes to decisions regarding radical innovations. Such consultation can be considered a connection between the two exploitative and explorative parties. It mediates the organizational integration and enables the linking of previously unconnected knowledge sources (Cohen & Levinthal, 1990). More importantly, it provides opportunities to enhance resources and create synergies that stem from both exploitative and explorative units (O'Reilly & Tushman, 2007).

With this in mind, the following theoretical proposition can be made:

Theoretical proposition 1: *The know-how of exploitative key players, which mainly focuses on incremental innovation, is sometimes consulted by explorative key players when it comes to decisions regarding radical innovations.*

Efficient knowledge integration from other units within the company as well as knowledge integration within the same unit is important in today dynamic markets (Grant, 1996). This forms the basis for the first two theoretical propositions of this thesis.

It is generally safe to assume that contacts between exploitative and explorative players do take place, especially in decision-making, but also through loosely coupled networks driven by self-interest. Daft and Lengel (1986) stated that cross-functional interfaces support the sharing of information, the definition of a common frame of reference, the spreading of knowledge, and thereby the building of an understanding and agreement on a subject. As stated in the proposition above, which concerns the role of knowledge in explorative players making the right decision,

the same can be said of decisions made on the exploitative side. As Levinthal and March (1993, p.105) have stated, exploration involves “a pursuit of new knowledge,” whereas exploitation involves “the use and development of things already known”. Knowledge of explorative players about radical innovations, even though it might be new knowledge, can also be used by exploitative players. Peers on both sides are usually well known to each other, and they share their knowledge in official and unofficial contacts. They are employed in explorative or exploitative units or functions, and there are usually enough opportunities to share viewpoints, get to know each other, and set up a basis for later counseling or consultation, which could be worthwhile for them with regard to decisions to be made. Exploitative players and decision makers, who might have been explorative players themselves in a previous function, also rely in some situations on the newly gained knowledge of the explorative players. For example, when a new investment is made in an explorative unit and new capabilities arise from that investment, an exploitative player might be able to take advantage of this. This could take the form of an incremental improvement of a manufactured part, which can now be produced faster with the new investment or might achieve higher quality. Since the newly gained knowledge from explorative units or new knowledge coming with a new investment can be of advantage also for exploitative units, in terms of efficiency-augmenting aspects in the form of positive spillovers, it should be made available to colleagues. The announcement, for instance, of a new technology’s implementation within the company often happens through official hierarchical channels, or it is, for example, mentioned in the company’s newsletter, where exploitative players receive the information about the innovations currently being implemented which can trigger them to become interested.

Lavie, Stettner, and Tushman's (2010) study about ambidexterity takes exploration and exploitation as dependent activities. There is a deeper and closer interdependence between explorative and exploitative players when it comes to knowledge transfer. In this respect, a player that works on a new product, service, or process innovation creates new knowledge which can also enhance existing products, services, or processes (Leonard-Barton, 1992; Gibson & Birkinshaw, 2004). It is assumed that such new knowledge also feeds back into the daily business operations, mainly through the simple interest of exploitative players in the innovation.

Furthermore, exploration and exploitation depend on each other for various reasons, usually by sharing the same business, the same lead of the company, to some extent the same culture, the same geographic premises, or, as mentioned above, the same social circles which can

be the canteen, the company's soccer club or a cadre event. Holmqvist (2004) also suggested that in order to manage path dependencies and inertial forces, a continuous exertion in both exploration and exploitation is essential to maintain a balanced ambidextrous organization. Therefore, the dependence of exploitative and explorative units on each other should be given high priority in order to fortify a corporate balance in regard to ambidexterity.

Explorative units turn into exploitative units over time in one way or another (Brunner et al., 2010). This transformation occurs with the respective personnel, with part of the current personnel, or indeed without them. A unit's status depends a lot on the maturity of the product which the unit delivers. If the product is in its design and development stage, the term explorative unit is appropriate. When a product has already been successfully launched in several markets, the unit is not explorative anymore, but becomes exploitative. Each new and successful product is prone to become routine at some point, produced in a standard and preferably efficient business process, where incremental innovations improve the overall product and production process. According to Siggelkow and Levinthal (2003), the subsequent reintegration of explorative units into the exploitative side of the company, after having been structurally separated, improves the overall performance of an ambidextrous organization in the long run. The explorative unit initially allows the firm to explore and eventually spread its new knowledge across the exploitative units within the company. Such knowledge transfer is believed to be already active before the official start of the unit's reintegration. As stated above, employees talk to each other at all the official and non-official gatherings within and outside the company and spread the news about innovations and the possibilities and challenges coming with them. Employees are in constant contact with each other through multiple official and unofficial channels. Therefore, the unofficial reintegration process is believed to be an ongoing process, as if such an explorative unit never really "left" the company.

Lavie et al. (2010) note that ambidextrous organizational forms are composed of multiple integrated architectures, such as unofficial architectures or networks, which are sometimes inconsistent with the official organizational structure. Social networks within a company are often aligned with the formal structure, but they do not have to be. Newly developed or acquired innovations will become a standard product or, in the case of process innovation, a production factor which all players are aware of and acquainted with its prospects if possible. Given the multiple integrated architectures (Lavie et al., 2010) and the fact that radical innovations bring new capabilities into a company, of which exploitative units might also be affected sooner or

later, exploitative players keep abreast of such innovations out of sheer professional and personal interest. Exploitative players would also try to improve their own processes with knowledge generated in radical innovations whenever it is available.

Boundary spanning between exploitative and explorative activities is considered as a core aspect within ambidextrous organizations, although it is under researched (Rosenkranz, 2012). Since organizational integration mechanisms, such as sharing and nurturing (Raisch, 2008), facilitate the knowledge exchange and knowledge combination between exploitative and explorative units (Kogut & Zander, 1992; Tsai & Ghoshal, 1998), the same is thought to be found when exploitative players interact with explorative players. According to Rowley, Behrens, and Krackhardt (2000), the connectedness of individuals with other peers enables them to develop a deeper understanding about their own processes and technology as well, to improve and further refine the own existing processes, products and services, and to share knowledge on how to implement improvements effectively (Dyer & Nobeoka, 2000). Exploitative players who receive knowledge from explorative players and are open minded about applying it might be able to achieve incremental innovations in their exploitative functions as well. Interacting in cross-functional interfaces helps learn from each other (Nonaka & Konno, 1998) and broadens their knowledge into other fields of expertise (Bahrami & Evans, 1987). This leads to the following proposition.

Theoretical proposition 2: *The know-how of explorative key players, who focus mainly on radical innovation, is sometimes consulted by key players involved in exploitative activities when it comes to decisions regarding incremental innovations.*

2.4.2. Theoretical propositions related to the different key players

There are different roles for employees in ambidextrous organizations, though they are not clearly defined yet by current literature. According to Baldrige and Burnham (1975), the roles that the players influence their innovative behavior, mostly because of power, but also due to communication links, as well-established connections of this type can be used to have an influence on the adoption of an innovation. A role with power does not have to be necessarily a role with hierarchical authority; it can also have other forms of authority. A role that can influence innovation activities and their success is the role of a “champion” (e.g. product

champion) (Burgelman, 1991). A champion of this type does not necessarily have to hierarchically higher, but still has the power to activate hundreds of people to work for him/her if needed (Peters & Waterman, 2004).

Moreover, there are other roles for integrating, for example, an explorative unit into the rest of the company, such as “senior team integration” (Jansen et al., 2009). However, no specific roles for each employee in explorative and exploitative units have been defined or described so far. With regard to the level of analysis (Raisch & Tushman, 2011), scholars have observed ambidexterity at the level of business units (Tushman & O’Reilly, 1996) and the corporate level (Harreld, O’Reilly, & Tushman, 2007) without defining different roles for each level.

Furthermore, in order to achieve ambidexterity, organizational integration mechanisms facilitate value creation by linking players or sources of knowledge that were not connected before (Cohen & Levinthal, 1990). Such integration mechanisms also support the spreading of synergies across explorative and exploitative units (O’Reilly & Tushman, 2007). Nevertheless, roles inside such integration mechanisms, especially when it comes to unofficial channels, are widely undefined. In this respect, Jansen et al. (2009, p.808) suggests:

“Our study reveals that ambidextrous organizations should carefully design and implement specific types of integration mechanisms at different hierarchical levels. At the corporate level, ambidextrous organizations should encourage (informal) social integration among senior team members. At lower hierarchical levels, however, ambidextrous organizations should establish more formal cross-functional interfaces that deepen knowledge flows across differentiated units yet retain the contradictory processes and time orientation within explorative and exploitative units.”

There should be defined roles with regard to ambidexterity within the existing integration mechanisms. The roles for informal social integration at the corporate level as well as formal cross-functional interfaces at lower hierarchical levels remain an area to be explored within this stream of research. Moreover, social networks, cliques and coalitions are crucial for ambidextrous organizations to be successful at multiple levels of analysis (Pettigrew, 1990; Kleinbaum & Tushman, 2007; Taylor & Helfat, 2009).

Beside these roles, employees/players have their official job descriptions, titles, and tasks to fulfill. In their tasks, forming part of the value chain, they have interactions with and access to other players, giving them access to other knowledge. According to Sorenson, Rivkin, and Fleming (2006), the assimilation of complex knowledge depends considerably on access to the source. The better the access to the knowledge, the less likely people are to fail in applying it later in their own organizational unit.

Since ambidexterity refers to the parallel pursuit of exploration and exploitation through differentiated units or individuals (i.e. structural ambidexterity), Gupta, Smith, and Shalley (2006) state that, with each unit specialized in exploration or exploitation, each player within a unit might have a specified role. Mom, van den Bosch, and Volberda (2009) posit that receiving knowledge from players within the organization that are on a higher hierarchical level is positively related to exploitation, because they direct the exploitation activities, whereas receiving knowledge from players that are at lower or at the same hierarchical levels in the hierarchy is positively related to exploration instead, since they are at the very frontline in their work and close to specific new technologies or customers which can trigger the development of new products.

Having key players with unique knowledge in different departments or units, some within a leading position and some without, implies that most experts would fit best into an explorative unit, supporting the design and development of a new product, process or technology. Nevertheless, there are key players within exploitative units on whose know-how companies depend a lot. They might not be able to join a project team that is implementing an innovation, but rather stay within the exploitative unit doing their daily tasks while advising the project team with their expertise. One case of this could be a composite workshop, where the leader has 25 years of experience with various composite materials and with various forms of production, such as using different autoclave oven systems, while his employees only have experience with working on one or a few certain steps in the whole process without knowing much about the others. That leader could probably be responsible for all composite parts in an exploitative and value-enhancing unit in a large company, but at the same time only cover a small part of the whole value chain. Nevertheless, the whole company would rely on this person and on his know-how in the application of the technology. When the company plans to design a new and innovative product with certain composite parts or some related technology, this key player and his knowledge will be required, even though he might not be working in the explorative unit as

such. In order to be able to design and develop the product, his knowledge about the capabilities, strengths and weaknesses of composite materials is crucial.

Peters and Waterman (2004) found that individuals and their capabilities, like information processing or commitment and enthusiasm, can make a difference. One player might be, because of his job and specific allocation, an exploiter, but since his knowledge is really important to the whole company and its future success, he also acts as a sort of consultant to the explorative unit as interaction occur between them. That player can be associated with a high status, since he is the expert in the organization and known as such and becomes the point of reference for every question regarding his part of the value chain in the business process. As a result of this and possibly due to an inherent dislike of change, that actor may prefer to not share his knowledge with an explorative newcomer, and rather prefers players with which he has worked together before (Podolny, 1993). In such a case, the player would be mitigating the integration of explorative activities into exploitative ones.

Another possible link occurs in the opposite case, when a key player in an explorative unit is being contacted by a key player from an exploitative unit. Such an explorative player could be, for example, a lead engineer or a respected leader in an explorative unit who is responsible for innovation and is known to prefer being innovative, rather than having a job with recurrent and routine tasks. That person would be responsible not only for a new product, process, or technology, but also for the required investments for the innovation. Such decisions about investments can again can or depend on the knowledge and experience of exploitative players, having years of experience with similar technologies, products, or processes, for example, the leader of the mentioned composite workshop. In this case, an exploitative key player supports an explorative player in his decision making process. Explorers or explorative players are often key players with specific knowledge about new technologies, products, or processes, which can have an effect on existing applied technologies, products, or processes within a company, which leads the exploitative player to ask the explorative player for input.

Considering the proposed key players' roles for employees, there are of course limitations within all defined roles. There could be an "exploiter" without a leading function, who is still be the only source of knowledge in a company because of his expertise. There could also be a lead engineer, responsible for several employees as well as for profit and losses, who could just be an explorer and still not the right person to be called on by exploitative players when it comes to

decisions and opinions to be made. These roles are often congruent with the player's function in the company, but they do not have to be. The key players usually have a high profile at the company formed over the years due to their excellent advice.

Key players can be the most experienced and knowledgeable persons concerning a technology, because they have several years of experience with a specific technology (Evan, 1966), or simply people with prestige and high informal status with whom players with a lower status like to be associated and try to enter their esteemed teams or informal groups (Goode, 1978). According to Evan, most experienced players are able to say whether an idea fits into the current setting or whether the actual technology could be improved as such. But the opposite could also be true, i.e. that an innovation can also originate at the upper hierarchical level. It is thought and initiated there, because people at the top can also be experts in their domain. They are key players that have specific knowledge and possibly authority and can therefore influence the integration of explorative activities directly, in positive and negative ways.

Key players can also be stigmatized as either role takers or role makers (Graen, 1976), with role takers considered people that follow their job description and remain within the defined boundaries and therefore fortify norms and structures, versus role makers who act upon their sheer interest and inner compass to follow innovations and might also challenge and provoke existing norms and structure as a result (Rosenkranz, 2012). Role taking or role making also affects exploitative and explorative functions and how every single individual understands his or her task (Journal, Kleinbaum, Tushman, & Lynch, 2007).

Another interesting sort of player is the so-called "liaison personnel", who usually connect cross-functional interfaces between exploitative and explorative activities (Gupta & Govindarajan, 2000) and ensure the flow of knowledge with their specific learning modes. There is also the aspect of nurturing and reverse nurturing (Raisch, 2008), when e.g. an exploitative unit nurtures a new explorative one, whereas later reverse nurturing takes place and the former explorative unit begins bringing back knowledge into the exploitative units. It remains unclear who "liaison personnel" are and what characteristics such personnel have to have.

Moreover, in social interactions, certain actors that are situated at a specific location in a social structure, have certain advantages, like access to resources, personal contacts, or access to specific information (Tsai & Ghoshal, 1998). The relational dimension or social capital is

compared to the mentioned structural dimension, referring to such parameters as trustworthiness and trust itself. Tsai and Ghoshal (1998) concluded that a trustworthy actor (e.g. an innovation leading explorative player) is likely to get other players' support for achieving goals, which would not be granted if trust is absent.

We can conclude that there are certain key players or specific roles that support the integration of explorative units. If there are key players or roles that support the integration of explorative units, it should be assumed that there could also be key players/roles that obstruct or hinder the integration of explorative units. This cannot be concluded from the theory, but since there could be facilitating factors, the contrary can be assumed to exist as well. Therefore, the next theoretical proposition is phrased with both positive and negative expressions.

Theoretical proposition 3: *There are some key players that support or hinder the integration of explorative activities into exploitative activities.*

Boundary spanning activities are used to integrate knowledge (Santos & Eisenhardt, 2005), that can be key when an innovation needs to be implemented. The interactions between exploitative and explorative players, which are boundary-spanning activities that integrate knowledge, could have positive effects regarding the innovation's implementation. In particular, technological innovations, as described above, usually require usually the sharing of knowledge between key players. As either the explorative or the exploitative unit acquires a technological innovation, it retains potential for the non-acquiring unit, which might also be able to use the new technology. For example, when an explorative unit buys a new machine that is able to do 3D printing, the exploitative unit might also take advantage of this technological innovation.

On the other hand, ambidextrous organizations need complementary internal and external social relationships, where complex social networks are said to balance the different tensions (Raisch et al., 2009). Maintaining such networks demands frequent interactions between their players. Relevant interfaces and the interactions at them keep exploitative and explorative activities and their players connected and support the dissemination of capabilities and knowledge across them. This allows for a recombination of knowledge (Dougherty, 2001; Gilbert, 2006) between incremental and radical innovation, which is believed to leave positive

spill-over effects, e.g. when a radical innovation that is being implemented can also be used in another aspect in order to incrementally improve exploitative business activities.

Connectedness facilitates knowledge transfer (Jaworski & Kohli, 1993) and is defined as an organization's social network in regard to its density (Nahapiet & Ghoshal, 1998; Sheremata, 2000). The bigger such networks across hierarchical levels and horizontal structures, the greater the theoretical opportunities for knowledge sharing between exploitative and explorative activities that are associated with it (Nahapiet & Ghoshal, 1998; Hansen, Podolny, & Pfeffer, 2001; Subramaniam & Youndt, 2005). According to Bourdieu (1986), social capital comes from relationships that are created through interactions between individuals (Nahapiet & Ghoshal, 1998). Social capital was first associated with strong personal networks based on trust, cooperation, and collective action (Jacobs, 1965). Scholars generally agree on the importance of such networks and the relevance of using or trying to use them for corporate actions or initiatives. Through such networks, potential resources, for example knowledge, can be accessed (Bourdieu, 1986; Putnam, 1995).

Social capital is defined as a "set of social resources embedded in relationships" (Tsai & Ghoshal, 1998, p.464), among which other scholars also include the norms and values of such relationships (Coleman, 1990). Also, the greater the opportunity for participation in interactions, the richer the transmission channels (Gupta & Govindarajan, 2000), which is positively related to knowledge transfer. This knowledge transfer, on top of other positive effects such as competence development (Floyd & Lane, 2000), improved problem solving (Sheremata, 2000), confirming beliefs in past decisions (Rivkin & Siggelkow, 2003), is believed to have a positive influence on an innovation by allowing people to better understand it and lose their anxiety about it and its possible effects.

The interactions are thought to have a positive impact on the applicability of technological innovations, mainly through the simple informal network of key players who communicate with each other and expand the field where innovations are engaged. When investigating how innovation happens between several individuals and teams, it should not be regarded as the result of one individual but as the result of the interactions that take place between all of them (Håkansson, 1987). Such interactions, e.g. the ones within a network of personal contacts, have a positive influence on the speed with which ideas, knowledge, and information are spread across its reach (Burt, 1992; Nahapiet & Ghoshal, 1998), which is

thought to have positive side effects regarding the assimilation of innovations. Furthermore, intergroup ties that lead to iterative communication between players allow for faster dispute resolution (Nelson, 1989), which can be very important when exploitative and explorative players, with their different cultures, are working closely with each other. Having lots of personal relations decreases the individual sense of being isolated and motivates individuals. Such motivation increases the wish to cooperate in a joint undertaking between different players of a personal network, which then improves trust and mutual identification (Coleman, 1990; Adler & Kwon, 2002;). Peters and Waterman (2004) state that “nothing more effectively involves people, sustains credibility or generates enthusiasm than face to face communication” (p.248).

Based on this, the following theoretical proposition can be proposed:

Theoretical proposition 4: *The interactions between different key players involved in explorative activities and exploitative activities have positive spillover effects with regard to the implementation of technological innovations.*

Informal social relations between exploratory and exploitative players are found to be important for information to flow, which contributes to the search for innovation and the spreading of knowledge (Nahapiet & Ghoshal, 1998). It can therefore be due more to informal social relations than to formal hierarchical or organizational affiliation that the explicit search for innovation and the spreading of knowledge is made possible.

Informal integration mechanisms have been found to have substantial influence on boundary spanning between different organizational units by different authors (Galbraith, 1973; Tsai, 2001). According to Subramaniam and Youndt (2005), human capital, (i. e. human resources) is strongly tied to social capital. They state that individuals’ knowledge is shared, distributed, and channeled within a group, while the group itself remains crucial, because only the group allows the sharing and processing of information in a fast and accepted way.

Informal relationships that stem from personal connections are voluntary in nature, as opposed to hierarchical connections (Tsai, 2002). Since informal interaction is mostly associated with voluntary interaction, it is considered to positively affect the interplay between explorative

and exploitative activities. Such informal exchanges are believed to support the transformation from explorative activities into exploitative activities.

According to Ebadi and Utterback (1984, p.161-162), the “frequency and ease of communication between people is the single most important factor for product innovation” . The ease of communication is leveraged through informal interaction at a certain iterative frequency. The ease of communication is said to be decisive for product innovation and also for any kind of innovation, since it affects knowledge transfer (Gulati et al., 2012). However, in addition to informal communication, there is formal communication (Daft & Lengel, 1986; Krone, Jablin, & Putnam, 1987) which should also be regarded as important. However, the focus in this research lies on informal communication, even though formal interactions are also having effects. Moreover, collaboration is said to be important when implementing innovation, in order to understand each others’ position and get familiar with an innovation (Daft, 1978). Such collaboration can also take place informally, especially between key players and opinion leaders, who can use their informal coercive power to build and influence others’ opinions. According to Daft, collaboration is needed especially when upper management imposes a technical innovation to be implemented, without the ideation coming from the actual technical workforce. Collaboration becomes essential in these cases, because it is difficult to impose a technology on a workforce and expect them to implement it without their commitment. In such cases, collaboration between upper management bringing in an innovation and the workforce that has to implement it and live with the implemented innovation is strongly recommended.

Managing boundaries between exploitative and explorative workforces implies parallel attention to creating and spanning boundaries (Helfat, 1997). As such, explorative key players try to span boundaries that are helpful in integrating an innovation within the exploitative workforce, while at the same time creating boundaries in order to prevent an innovation from losing its advantages by becoming altered too much in its nature by the exploitative workforce fitting it to their exploitative needs. Boundary spanning activities can be formal as well as informal. It is assumed that the information exchange that takes place within the boundary spanning activities supports the integration of explorative activities into exploitative ones. An informal authority, going against the officially appointed manager, does not have the authority to give orders or the privilege to lead others. However, informal leaders may have similar informal power which is based on experience, status, reputation, and gate keeping privileges (Gulati et al., 2012), which enable them to have considerable influence on the innovations to be integrated.

According to Jansen et al., (2009), at the top level, informal integration is found to have a significant mediating role in the successful implementation of innovations. Informal social relations directly contribute to ambidexterity. However, our knowledge concerning the full effect of the informal organizational structure on the coordination between exploitation and exploration is underdeveloped (Subramaniam & Youndt, 2005).

Considering the above, a new theoretical proposition can be formulated:

Theoretical proposition 5: *Key players support the integration of explorative activities into exploitative activities through informal information interactions.*

To close this chapter, it can be concluded that the literature review has allowed the identification of several gaps in current research on organizational ambidexterity. This thesis intends to contribute to closing these gaps. One main aspect concerns the interplay between explorative and exploitative activities and the boundary activities between them. Another relates to the roles of the key players, who are involved in the interactions between explorative and exploitative activities, and their effect on a technological innovation's implementation. These issues have been little explored up to now and are investigated more in this research.

The following chapter explains the research method applied in this dissertation, followed by the presentation of the main findings from the case studies.

3. METHODS



3.1. Introduction

An appropriate research approach was chosen according to the proposed research questions. In particular, research questions concerning aspects of “how” and “why” suggest a qualitative approach. The qualitative approach is capable of explaining presumed causal links in real life interventions and interactions that are too complex for a survey (Yin, 2014). Since this research project is focused on organizational ambidexterity and on technological innovation, it indeed tries to shed some light on complex phenomena. For examining such phenomena, a qualitative research approach is advisable.

3.2. The research strategy

Among the many research methods that can be applied in qualitative research, Yin (2014) distinguishes between case study methods, history analysis, and experiment. All of them are suited for “how” and “why” research questions. Compared to experiments that require a controlling of behavioral events or their manipulation, a case study investigates what is happening without interference. The history analysis, which relies on the same techniques as a case study, does not focus on contemporary events as the case study and the experiment do. Furthermore, history analysis cannot work with direct observation and interviews, which limits the applicable techniques. For the purposes of this research, the case study approach was chosen, since the object of interest concerns current or contemporary complex phenomena (i.e. history analysis is not applicable), and the events to be analyzed cannot be controlled by the researcher (i.e. no experiment is applied).

In particular, two different case studies were carried out at two different organizations belonging to the aviation industry (i.e. a high reliability environment).

3.3. Case study design

3.3.1. Design approach

The following model by Yin (2014) illustrates the research process in a case study.

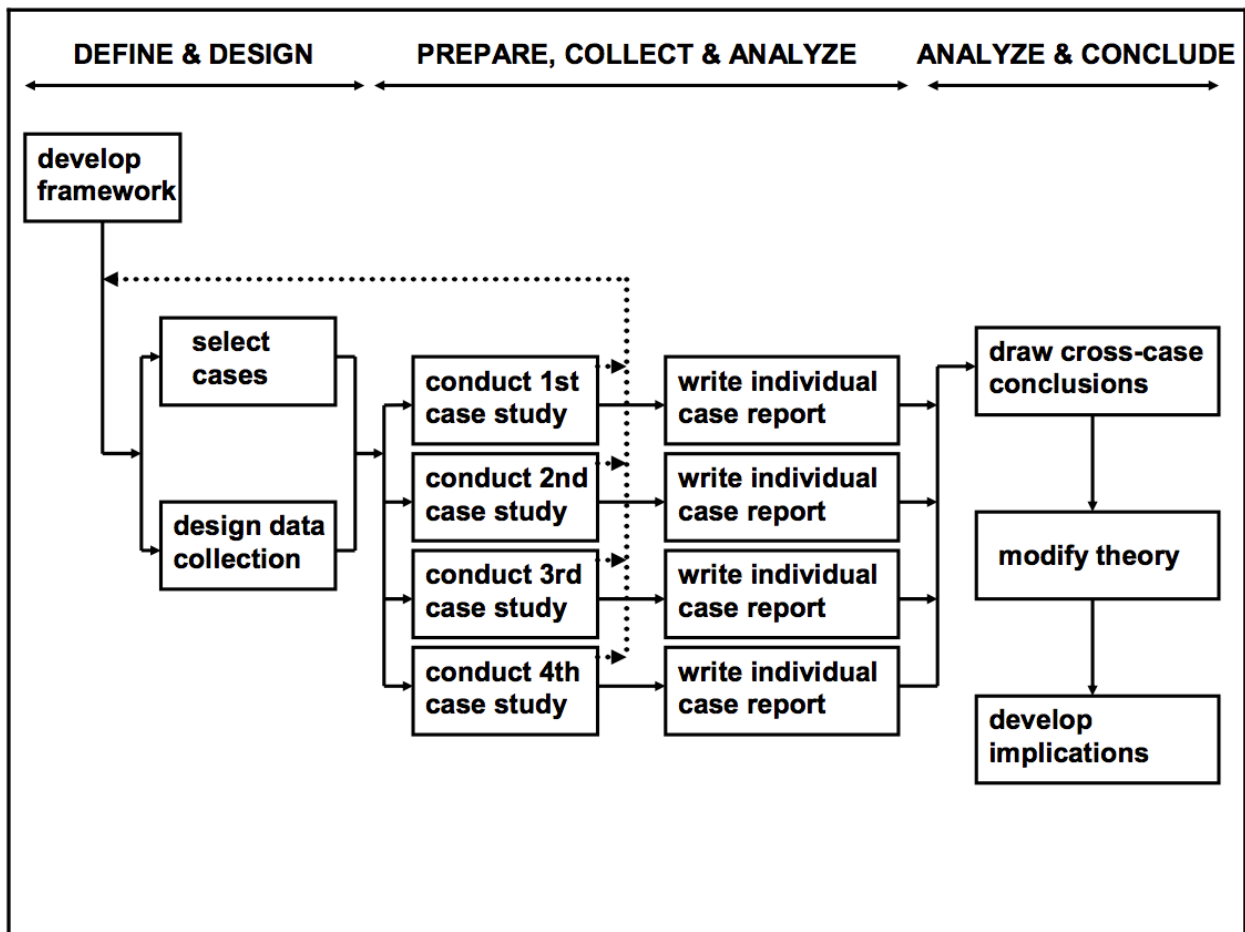


Figure 2: The process in case study research.

Source: Yin, (2014, p.60).

According to Yin (2014), there are five components which are especially important in a research design:

1. A study's research questions (refer to section 1.2. "Research questions and objectives").
2. Its theoretical propositions (refer to section 2.4).
3. Its units of analysis (refer to section 3.3.2).
4. The logic linking the data to the propositions (refer to chapter 4. "Empirical results").
5. The criteria for interpreting the findings (refer to chapter 5. "Discussion of the results").

The research carried out in this thesis fits the research design proposed by Yin (2014), fulfilling all of these components.

3.3.2. Units of analysis

In the two case studies analyzed here, the focus covers multiple units of analysis. The first unit of analysis is the organization, where the exploitative and explorative activities are taking place. The second unit of analysis is the team, in particular the innovation program team implementing the innovation. And the third unit of analysis concerns individuals or persons acting in a certain role within such innovation programs.

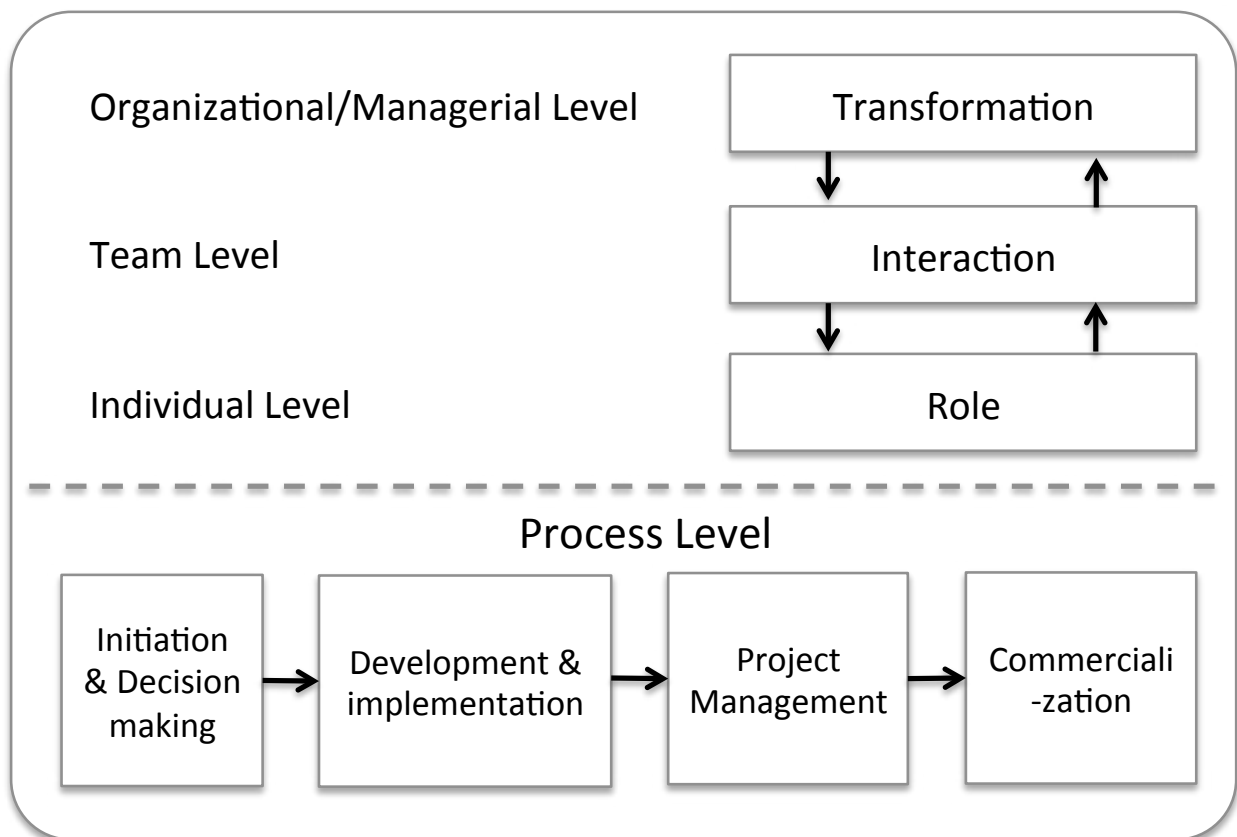


Figure 3: Units of analysis.

Source: adapted from Crossan, M.M. & Apaydin, M. (2010, p.1167).

3.3.3. Quality of the research design

The quality of a research design can be judged according to different concepts. These concepts contain logical tests like trustworthiness, credibility, confirmability, or data dependability (Yin, 2014). An important demand, as stipulated by Yin, concerning the rigor of case studies is that the tests and the different tactics used for conducting the case study should be used throughout the case study and not just in its original definition. Since case studies imply some inherent weaknesses, like subjectivity and the lack of precise data as output, it is essential to triangulate the data collection. Triangulation can be reached across theories (i.e. scientific streams), data sources (i.e. participants), and methods (i.e. interviews, observation, focus groups) in order to find convergence between multiple and different sources of information (Creswell & Miller, 2000). Denzin (1989) classifies triangulation very similarly as follows:

1. Data triangulation
2. Researcher triangulation
3. Theory triangulation
4. Methodological triangulation

Data triangulation refers to different data sources, namely, in this case, multiple cases or multiple units of analysis, or by data type, such as audio, quantitative data and qualitative texts (Miles, Huberman, & Saldaña, 2014). Theory triangulation is achieved when the subject of study is approached from different theoretical perspectives. Methodological triangulation is also accomplished when different methods are applied (interviews, focus groups, etc.). In this case study, all of these forms of triangulation are applied, except for researcher triangulation, as the nature of a thesis implies that there is only one researcher.

3.3.3.1 *Construct Validity*

According to Yin (2014), there are two basic steps in testing the construct validity in a case study: First, to define and specify what you investigate and relate it to the objectives of the study and, second, to identify operational measures that match the concepts.

Construct validity can be increased when multiple sources of evidence are used, a chain of evidence is established, and when key informants can review the case study report and confirm or disprove the content (Yin, 2014). In this case study, multiple sources of evidence are considered: different cases, different interview partners, and different data sources such as archival data, observation, and artifacts. Additional evidence can be gathered from focus groups (Remenyi, Williams, Money, & Swartz, 1998) where key players discuss the preliminary theory that serves as the basis for the research. The chain of evidence is established through a well-documented annotated bibliography, covering both case studies with all sources of evidence.

In the composition of the case study reports, construct validity can be achieved with the support of the key informants who review the case study, in the sense of members checking the report before its release (Creswell & Miller, 2000). In this research, after the data gathering process was completed, both final case study reports were handed in to both companies involved in the case studies and distributed to all interview partners. The resulting feedback was implemented accordingly. Nevertheless, since the whole case study work took place over two years, during which iterative feedback was given and received, the final case study report rather represented a formal completion of the case.

3.3.3.2 Internal validity

Internal validity is mainly a concern for causal or explanatory case studies (Yin, 2014). The internal validity in this case study can be strengthened through the following tactics. Internal validity is strengthened when causal relations between specific conditions and the results are clearly related to each other. This is assured through a mixed application of different protocols throughout the case studies and a well-documented annotated bibliography, which gathered evidence over the course of the research work. Building well-founded explanations for chains of evidence is another tactic, as is addressing rival explanations, which was done in the qualitative analysis of the interviews and the focus groups. According to Yin (2014), logic models also help to ascertain internal validity. This was done by way of the different models that were developed during the case study (refer to chapter 5. “Discussion of the results”).

3.3.3.3 *External validity*

A survey relies on statistical generalization, while case studies can be said to reach analytical generalizations (Yin, 2014). The replication of the research in other contexts (i.e. companies) with similar conditions can support the analytical generalization of the findings. This analytical generalization can later be used to formulate a broader theory that pertains to the set of conditions under which the case studies were conducted. To conclude, external validity is a major barrier to generalizing findings beyond the immediate case in hand.

3.3.3.4 *Reliability*

The goal of reliability is to prevent or reduce bias and unnecessary error in the research process, so that another researcher would achieve the same results with the same steps taken (Yin, 2014). Several tools, such as the research protocol and the chosen methodology, documentation of individual steps, decisions, further planning, and ongoing justifications of decisions, were applied to aid comprehension and possible reproduction of the process. Since outcomes, findings, and notes from interviews are usually vague and subject to interpretation, a systematic and chronologically organized research protocol is essential for a case study, which was applied in this research. It also allows to “go back in time”, and see which notes, thoughts, and conclusions were recorded at a certain time. Each research protocol for each case has to be accompanied by an annotated bibliography that orders all gathered data in a systematic and reproducible way.

All data, scripts, records, and documents used in this research were structured and gathered in a reliable database for the research and can therefore be reproduced. Furthermore, all records of communication between the researcher and supporting faculty were kept for a potential review of the eventual decisions.

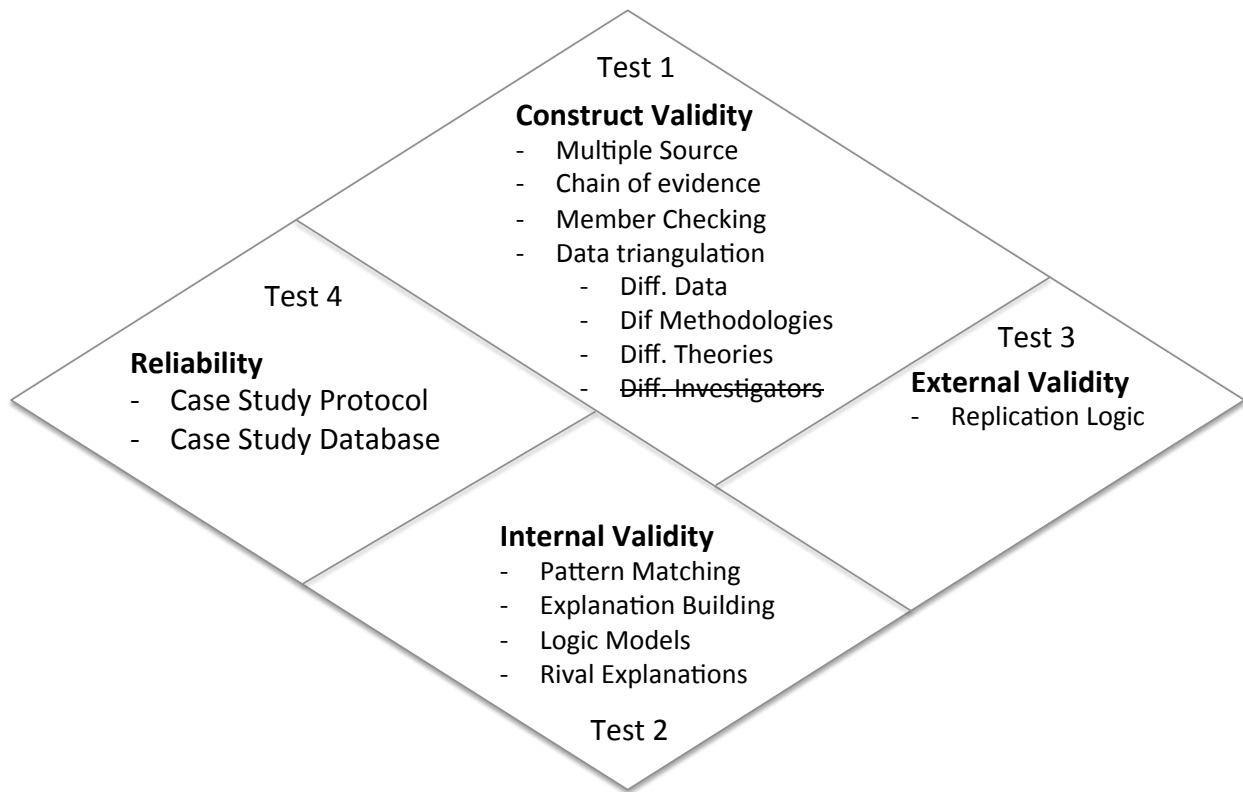


Figure 4: Assurance of qualitative research.

Source: Author.

3.4. Conducting the case study

3.4.1. Skills of the researcher

A lot of curiosity and an inherent urge to discover truth are formative features in the evolution of any researcher. A good stereotype of a researcher would be Sherlock Holmes, as suggested by Yin (2014), the criminal investigator who notices even the smallest abnormalities and draws a big picture of the case in which he discovers hidden links and connections which lead to a theory and finally the solution of the case. It has also been stated that a good researcher has to be able to ask good questions and interpret the answers. He/she should as well be a good listener without being trapped by their own ideologies and preconceptions, be adaptive and flexible, so that newly discovered situations and findings are considered as an opportunity, and not just as a threat. The researcher should have a good grasp of the issue being studied and, of course, of the

relevant theory as well. Finally, the person should be unbiased by preconceived notions, including ones from existing theories.

Regarding the researcher of this thesis, the sketch of the preliminary theory derives from his practical experience and observations in the HRO environment. Before becoming a PhD student, he was the leader of staff of the Chief Operation Officer at Pilatus Aircraft Ltd., a function that is assigned to the operational and process management area where organizational changes and innovations are everyday routine. From the point of view of an observer and in an active role, this very specific area of research is where he spent most of his time working in the last 15 years. Therefore, his practical knowledge about innovation and organization is quite broad and can support this research. Furthermore, he has led several change and innovation projects and reorganizations within the company and at its branches worldwide, in several cases of which he was directly responsible for the programs.

3.4.2. Preparation of the case study

The preparation of the case study was accompanied by interactive two-way communication/discussion between the thesis director and the PhD researcher. For both case studies, an agenda was designed and agreed on. This supported both sides involved in the case study and helped keep everyone involved to the process itself aligned. The relevant agenda is also part of the case study database, which is referred to, in the annotated bibliography. A previous pilot study was conducted at skyguide, where a close relationship exists between the researcher and the company and where the case study partner had some understanding of the given situation.

3.4.3. The case study protocol

3.4.3.1 *Overview of the case study*

According to Schramm (1971), an experiment abstracts from life to laws, whereas a case study organizes the details of life in search of patterns and insights. This case study tries to gain some insights into a yet underexplored topic, i.e. HROs with ambidextrous structures. The main goal

of this case study is to find out how the interplay between explorative and exploitative activities takes place in HROs. Another goal is to understand “how” this interplay is influenced by key players at such companies. The methodology applied is a multiple case study.

3.4.3.2 Purpose of the case study protocol

The case study protocol was newly designed to match the given case chosen for study (Yin, 2014), so that it fits the specificities of each case. Furthermore, the case study protocol was indexed according to a suggested table of content following a certain logic (Yin, 2013). The case study protocol was the guiding instrument in agreeing on the case study process with the company and guided the researcher and the company through the case study. It was not intended as a constricting rigid frame, as it could and, in fact, did change over the course of the process, when it was agreed to replace a second round of interviews with a focus group instead.

The sources of the data in this research are personal interviews, focus groups, limited direct observation, and secondary data. In order to gain relevant conclusions, also sources of the organization needed to be collected (Yin, 2014). With this in mind, artifacts and secondary data, like independent articles about the company, were also gathered.

3.4.3.3 Cases to be studied

Every case has to be selected carefully, with an according set of conditions, in order that it allows to predict similar results, which is also known as literal replication. It may also predict contrasting results, but for predictable or already known reasons (Yin, 2014). When considering multiple case studies, original findings are supposed and to some extent prone to be replicable. If they can be replicated, said findings are robust and relevant for further investigation or other analytical procedures. The conceptual framework itself should be rich in terms of the relevant literature. Furthermore, the framework should be able to explain under which conditions the phenomenon is likely to occur and under which conditions it is not. The mentioned literal replication that supports the finding of possible new cases that confirm the first findings contrasts with theoretical replication. In order to achieve theoretical replication, an equivalent number of cases has to be selected. When external conditions are apparently the same, a low

number of cases might be enough, because there is no major variations are expected in reaching theoretical replication. This was assumed to be the case in this research, for which two case studies were deemed to be sufficient.

3.4.3.4 Case Study Nominations

The selected companies for this case study are international HROs in Switzerland. One company is “Swiss”, the national flagship carrier and the other is “skyguide”, the Swiss and southern Germany air traffic control service company. Swiss offers an excellent case, specifically the introduction of a new aircraft into active service, as the company is designing/building a new aircraft cabin design with Bombardier (Swiss, 2016). Layouts in the new aircraft, from the galley to the seating, are newly designed, which leads to revolutionary processes when boarding and serving passengers. Product innovation within the cabin interior can be considered incremental, because the core concept and the links between the components remain the same. However, several processes within the new aircraft and the link between the concept and the components are changed and therefore considered as architectural innovation (Henderson & Clark, 1990). The other company, skyguide, is an appropriate case, because they are engaged in reinventing air traffic control procedure in a program called “Virtual Center Model” (VCM). With that program, air traffic control can become location-independent, i.e. an air traffic controller in Zurich can control aircraft in Geneva and so forth. In this case, the established core concept is reinforced, while the links between the concept and the components are changed. Therefore, this also represents architectural innovation (Henderson & Clark, 1990), but with radical tendencies. It is radical in that the product of the Virtual Centre, combined with the new processes, essentially removes the imminent need to be in the airspace that needs to be controlled. With the Virtual Centre, air traffic control services can be delivered literally from any place in the world to any other place in the world. What makes both scenarios excellent cases for research is the fact that both companies are very successful within the industry, both have products with very long lifecycles as all products in aviation has to be highly reliable and certified by official authorities, and they both operate within the same environment and under the same roof of the worldwide legal regulations of the International Civil Aviation Organization (ICAO) and European Aviation Safety Agency (EASA).

Both companies have a long tradition of existing in a unique market. Usually, employees in the field spend long time with a company, with average yearly fluctuation of less than four percent. In these micro-conditions of both companies and with these specific market conditions, employees are prone to stick to their companies and vice versa. Employees are very fond of their employers and show an affinity to aviation technology. There are a lot of social gatherings in and outside working hours, for example the expected arrival of an exotic or rarely seen aircraft at the airport or the rollout of a new aircraft. One of the most important conditions is that the key employees know each other and usually know what expertise the others have, because the industry is relatively small in scale. This fact is supported by the ongoing interdepartmental sharing of personnel e.g. after certain years in the same function or by the fact that all people in the same company tend to have several points of contact during their routine workday.

3.4.3.5 Company background information about skyguide

skyguide is the ANSP (Air Navigation Service Provider) of Switzerland with the “primary task to prevent collisions in the air and in the vicinity of airports and ensuring a safe, smooth and efficient flow of air traffic” (“skyguide: Air Navigation Services,” 2007). It is a joint-stock company under Swiss civil law and owned mostly by the Swiss confederation (“Welcome to the Swiss civil and military Air Navigation Service Provider,” 2014). The company’s monopoly is not absolute, according to the strategy of skyguide (Béron, 2014a): “At the international level, due to an increasingly market liberalization and aeronautical infrastructure getting certified according to uninformed criteria, a context of increased competition is now established not only for airports but also for companies operating in air traffic control (ANSP)”. With regard to innovation, skyguide is a HRO, but still offers innovative tailored solutions to its clients (“skyguide: ANS Solutions ‘managing complexity’”, 2013). Key aspects of HRO include that they track small failures, resist oversimplification, remain sensitive to operations, maintain capabilities for resilience, and take advantage of shifting locations of expertise (Weick & Sutcliffe, 2007). skyguide has the characteristics of an HRO and therefore has the equivalent setup with regard to the company’s structure and processes. According to skyguide’s vision, they embody continuous improvement in an innovative and entrepreneurial spirit (Béron, 2014a) and, according to the related mission, they claim to be a focused innovator and creative co-operator while creating value – adding solutions in their core competence areas (Béron, 2014). Core competences are a combination of skills and technology which rely on explicit and hidden

knowledge (von Krogh, 1995). In order to fulfill the mission, skyguide has to somehow activate the hidden knowledge in one way or another.

3.4.3.6 Company background information about Swiss

SWISS is the national carrier of Switzerland. It serves over 106 destinations all over the world from Zurich and Geneva. SWISS is part of the Lufthansa Group and a member of Star Alliance, the world's biggest airline network (Swiss, 2015e). Swiss is under the control of the FOCA. The company operates a total of 83 aircrafts with some 12 in wet-lease and employs 8245 people (Swiss, 2015c).

According to the Swiss Strategy Map, the conditions in the airline business are more challenging than ever. The global aviation industry is undergoing a transformation, as the Middle East is redirecting different traffic streams through their countries. Growth in Europe is limited due to the infrastructure of airports, increasing pressure in Europe and in intercontinental routes, and the competition from low-cost carriers (Dehne, 2014). With regard to innovation, Swiss is a HRO, but still has considerable room to be innovative as evidenced, for example, by the interior of its new aircraft that was mainly designed by Swiss, i.e. the Bombardier CSeries 100 (Swiss, 2015b); or, for example, in a process innovation joint project with skyguide, the FOCA and the Swiss Airforce, in which satellite technology is implemented (Swiss Media Release, 2010).

The phase-in program of the new CSeries aircraft analyzed in this case study is a case of contextual ambidexterity (Tushman & O'Reilly, 1996), which means that exploitative players are leading the innovation implementation of the new aircraft with its new interior ("Bombardier C-Series Project Organisation" as of July 1, 2013).

3.4.3.7 Nominations of interview partners

The personnel for the case study was nominated with a view to their function. Since this case study is conducted in the abovementioned environment and the specific conditions of the central European aviation market, three different hierarchical levels of key players are taken as a data source in order to get insights from different vantage points (Pettigrew, 1990). First, there are the

key players at the senior management level that decide when and how to start a new innovation activity (named A-Players in the case study protocol). Then, there are the key players responsible for teams with certain profound expertise (named B-Players in the case study protocol). The last group of key players is employees without substantial leadership function or lots of direct reports, but with a certain expertise, so that they are very well known within the company and asked for advice on a regular basis or contribute to the implementation of an innovation (named C-Players in the case study protocol). Choosing different players at different levels within the organization assures a broader perspective (Bourgeois & Eisenhardt, 1988) and mitigates subject bias (Golden, 1992). These three different levels of key players are the focus of this research. Others than that, and for the fine-grained choice of the ideal candidates for the research, a set of operational criteria were defined in order to select the most appropriate and promising candidates for data collection, which were then chosen in cooperation with the companies involved (Yin, 2014). In order to obtain HRO-culture-relevant evidence, narratives told by key players that stand for that culture are analyzed as well (Flick, von Kardorff, & Steinke, 2013), drawn from the interviews, the focus groups, or from direct observation.

3.4.4. Data collection tactics

During the case study at skyguide, documents were accessed through skyhub, the skyguide internal document management system, i.e. the intranet. There was also access to several important documents, such as procedural management documents on how to implement innovation. At Swiss, some program documents were received, e.g. the organizational chart, and the researcher was at liberty to use all information in the in-house magazine. There were also many articles from independent magazines and newspapers that were used as a source for further information. Additionally, 25 focused interviews were conducted, which lasted between 90 and 130 minutes. One of these was omitted in the analysis due to the somewhat contrary and non-cooperative attitude towards the questions asked by the interviewer. A structured interview guide with six sections after initial familiarization questions was used (Fontana & Frey, 1998). For each case study, at least 11 interviews were conducted until theoretical saturation was reached (Glaser & Strauss, 1967). Another data source was limited direct observations, which were made over the time the researcher was on site and in contact with representatives of the company. Observations derive mainly from interactions between the employees and between the employees and the researcher, but also from observing the break room and the informal chatter

itself. Also, physical artifacts were collected to a limited degree. A last source of evidence which is not specifically mentioned by Yin (2014) among his “six sources of evidence”, namely the focus group, was also used one year after the interviews to further develop and reflect on the accumulated findings at the end of 2014. Through this process of discussing certain issues together, non-public informal group opinions about a topic can be produced (Pollock, 1955). The focus group also supports this case study because of the debate about the topics between the participants and the eventual group opinions about a previously unknown phenomenon (Naderer & Balzer, 2011).

3.4.5. Collecting the evidence

3.4.5.1 Three principles of data collection

Data has to be gathered according to certain principles. First, multiple sources should be used whenever possible; then, all gathered data should be organized in a case study database, and finally, a clear chain of evidence should be maintained. The application of these three principles supports the validity and reliability of the research project. The use of multiple sources also helps triangulation in the data collection. It can be distinguished between data triangulation, where different data sources are used, researcher triangulation where the researcher changes, theory triangulation where the case is described from different theories, and methodological triangulation where the applied methods change. The case study database should contain all relevant notes of the researcher, gathered documents, tabular materials, and narratives. The notes do not need to be in an electronic format, and can be handwritten. They need to be indexed and listed in the annotations. Having a well-documented chain of evidence allows an external observer to follow any conclusions from the evidence, ranging from initial research questions to ultimate case study conclusions according to Yin (2014).

3.4.5.2 How key informants were contacted

Each company in the case study agreed to supply a designated internal chaperone and facilitator for the case study and activities needed to gather relevant data. At skyguide, this was Jeannette Haus, Chief of Staff, and her deputy, Christian Weiss in Wangen-Dübendorf, Switzerland. At

Swiss, it was Senior Director Patrick Heiz, Head of Commercial & Logistics Technology. After agreeing to the case study protocol and the process and data collection procedures with both chaperones, exact dates, times, and contact persons were defined. Key informants were, in the first instance, contacted through said chaperone and, afterwards, directly by the researcher. The co-evaluated interview partners then agreed on a date to meet. Ahead of the interview, all interviewees were given a short introduction into the topic and a description of the process for the interview.

3.4.5.3 *Unanticipated events*

Providing a contingency plan for unanticipated events and changes in the availability or mood of interviewees, the following principles were planned in anticipation.

Happening	Action	Occurrence
Missing participant	Postpone interview/focus group etc.	Several interviews had to be postponed and dates changed (refer to observation protocol for details)
Participant reveals that he/she is not ready for the interview, because of personal reasons	Support the participant to be able to participate or find another date; in the worst case, find a replacement	No occurrence
Participant reveals that he/she is not ready for the interview, because of structural or organizational reasons	Mitigate organizational or structural reasons with the chaperone if possible	No occurrence
Not foreseen:	An interview partner was not very forthcoming and responded to few questions. It was recognized that this person joined the company only approximately a year prior to the interview and therefore barely able to answer all questions. This interview was removed afterwards.	

Table 1: Unanticipated events.

Source: Author.

3.4.5.4 *Tools used in the case study*

The equipment used for the case study was the following:

1. Personal computer.
2. Voice recorder (accepted by all interview partners).
3. Paper and writing utensils.
4. A pre-established undisturbed place to write notes in private.
5. Some introductory slides about ambidextrous organizations and their specificities.
6. A figure was produced concerning the program structure and its players (refer to the case study database).
7. “ExpressScribe” was bought for the transcription of the interviews.

3.4.6. Methods applied for data gathering

In case studies, evidence can come from six different sources (Yin, 2014). These sources are documentation, archival records, interviews, direct observation, participant observation, and physical artifacts.

3.4.6.1 *Interviews*

Interviews are one of the most important sources, in the form of guided conversations with the interview partners, in which more “how” than “why” questions are asked to prevent defensive answers. The interviews were to some extent also focused interviews or rather included focused questions. The interviews were open-ended, but kept to the research protocol and used questions to test and confirm certain facts. All interviews were recorded and transcribed, which was very helpful for data consistency and its analysis. Starting the interviews, the researcher introduced every interview partner to the definitions and terminology used in the questions. In order to facilitate the discussion, the researcher produced an influence chart in each interview, naming all players that were discussed. The influence chart contained a small circle within a larger one. Players allocated to the inner circle are part of the full-time innovation program team. Players

that worked towards the program are allocated in the outer circle. Finally, players from the second circle are not part of the program team, but contribute in some indirect way.

For carrying out the interviews, two interview manuals were used. The first one was the analytical interview manual (refer to the appendices) which contains the underlying questions that should be answered at the end of an interview. These questions were directly derived from the research questions and theoretical propositions. Since these questions do not fit the form or, partly, the contents of the questions to be asked, a second manual was produced, the practical interview manual. This practical interview manual represents a version of the analytic interview manual in which where academic and conceptually relevant terms and phrases were translated for the interview partners into a more readily understandable language.

The practical interview manual (refer to the case study protocol) is the manual used during the interviews. This manual contained warm-up questions that prepare the interview partner and make him/her comfortable with the topic. These warm-up questions furthermore served for the purpose that the interviewer and the interview partner get to know each other and get acquainted with each other as well as to establish a trusting environment. Between the different groups of questions (role, interaction, and organization), some introductory sentences build a bridge with the interview partner. Each group of questions was introduced during the interview in order to bridge the topics accordingly for the interview partner.

3.4.6.2 Documentation/Archival Data

Documentation in this case includes meeting minutes, organizational charts, internal change execution documents, newspaper articles, and memoranda. It is important that every document was written and addressed to a certain sort of people, so this has to be taken into account when analyzing them. Archival data/records would be of interest for this research project as well. Since the archive of Swiss was still inaccessible, due to an ongoing lawsuit following the insolvency in 2001, and the systematic collection of former projects and programs (project management office) at skyguide only started in 2014, questions about older performance or other issues regarding research-relevant topics were included in the interviews.

3.4.6.3 *Direct/Participant Observation*

While conducting the case study, there was no explicit direct observation. Nevertheless, during the case study and on site, field notes were taken (Eisenhardt, 1989). Said field notes did not comment on all procedures, but they recorded the impressions that seemed worth noting. Noting down impressions or taking pictures might become crucial in a later stage when more is known about a case. In the case study, limited direct observations were applied for the purpose of delivering contextual reality in real time (Yin, 2014). As always, the case study allows subjectivity; therefore it is always a prerequisite to evaluate the phenomena in its specific context, taking into consideration hidden agendas, hierarchical levels, personnel attributes, the current economic situation of the company and especially its culture. The participant observation brings similar advantages as the direct observation, but with an insight into personal motives and the resulting behavior. By allowing to get to know a participant of the case study in depth, recurring meetings over a certain period of time and the ongoing records from these events achieve a deeper insight into the person itself as well as the case. When engaged in participant observation, special attention has to be put on not becoming biased. One hindering aspect in participant observations according to Van de Ven & Huber (1990) is that: “if you are sensed by a social system, then you are part of it. If you are part of it, you affect it. If you affect it, you cannot observe the system in its natural state and can report only the processes of a disturbed system”. This issue was considered when doing the focus group in each case, in order to try to confirm the gathered data and reveal other insights. Nevertheless, participant observation was very limited and put into the same observational protocol. No people were followed over a whole day or consecutive days, but the participants were observed to a limited degree throughout the case studies, in all occasions on site.

3.4.6.4 *Focus groups*

In the first instance, the abovementioned sources of evidence (Yin, 2014) were used. It was assumed that these sources of evidence were sufficient in order to conduct the case study research. Although Yin does not mention the focus group as a source of evidence, it showed that the obtained results had to be discussed again with the interview partners to get at latent underlying opinions (Pollock, 1955). Furthermore, group discussions were not considered the sum of individual opinions, but the product of collective interactions instead (Flick et al., 2013).

3.4.6.5 *Physical artifacts*

The last source of evidence, the physical artifacts, were not planned to be used or applied. Nonetheless, as the case evolved, some artifacts were received, including e.g. parts of old technical equipment that was being replaced in the innovation program. These parts are also included in the case study database. They rarely proved anything regarding the findings, but rather show what the innovation programs in the examined organizations are about.

3.4.7. The interviews: preparation and conditions

3.4.7.1 *Preparation of the interviewer*

Before the first meeting with Jeannette Haus, the skyguide chaperone, a personal ID badge had been ordered in order to comply with all internal security policies at skyguide. Diverse documents had to be handed in by the researcher to apply for that badge. In order to prepare for the case study in terms of contents and methodology, several relevant books and articles were studied training in addition to the other literature (Pettigrew, 1990; van de Ven & Huber, 1990; Yin, 2013, 2014). For each visit at Swiss, a visitor badge was produced at the headquarters (refer to the case study database). For each interview, an empty program layout of the innovation under observation was prepared, which was then filled out with the interview partner.

3.4.7.2 *Preparation of the interview partner*

The interview partner received an invitation letter by email with all relevant information, which the interview partner had to know. Furthermore, a non-disclosure agreement was established with both companies to ensure that no information was abused for different purposes than this explicit research and the thesis. All data was protected safely with no access for people other than the researcher and the supporting faculty. All answers by the interview partners were encrypted, so that no inferences could be made as to who said what in response to which questions; the interview partners were informed of this. Other than that, interview partners were advised to not prepare for the contents, so that answers would come naturally and without being

influenced by second thoughts or biased by theories. All interview partners were informed of this.

3.4.7.3 Conditions before, during, and after the interview

After having determined the dates, time, and location for the interviews, the interviewer and the interview partner met for the first time before the actual interview. The start of the interview included warm-up questions (personal questions No. 1 - No. 4) in order to establish good feeling and get acquainted with each other. The interview partner was told how long the interview would last and reminded that all answers were going to be encrypted, and everyone was asked whether the interview could be recorded. After starting with general questions about the interviewee's function and organization, the central questions were asked, requiring about half the time of the interview. At the end, some phase-out questions (phase-out questions No. 39 - No. 41 of the case study protocol) were asked. Those questions were aimed at recovering the status quo, while signaling the upcoming end of the interview and thanking the interviewee for the time spent on the case study. A short outlook was also given regarding the case study report that would be handed to the interview partners to confirm their statements within the interview. Furthermore, interview partners were informed about the focus group planned for a year later.

3.4.7.4 Risks of the research and its outcome

Ahead of the interview phase, possible risks were identified and the following mitigation strategies defined:

Risk	Description	Mitigation
1	Answers of interview partners can be traced and related to an identifiable person.	The results and records of interviews are separated from personal data in a first instance and can only be reconnected by the research team. In a second instance, interview partners are anonymized with a reference number regarding their delivered data.
2	The resulting data is insufficient in terms of data sufficiency.	A follow-up focus group discussion can be used, as was done here in the place of a second interview.
3	No conclusions can be drawn from the gathered data.	Discuss how to proceed with thesis director and skyguide/Swiss (apply more methods/techniques, abort project etc.)
4	Interview partners do not agree on some circumstances	Find out what the difference is based on and expand the case study accordingly.

Table 2: Risks in the research and their implications.

Source: Author.

3.5. Analyzing the case study evidence

3.5.1. Analytical strategy

There are four basic strategies for analyzing the data in a case study (Yin, 2014). The most suitable one usually consists in relying on the theoretical propositions. A second analytical strategy is focused on thinking about alternative interpretations or rival theories. The third and least important strategy in analyzing a case study is the development of a case description. There is also a simple way of interpreting findings, especially when the researcher is lost in the data, “Stand back and think about what you have learned. What are the major lessons... What will those who use the results of the evaluation be most interested in knowing?” (Taylor-Powell & Renner, 2003, p.5). The last strategy uses qualitative and quantitative data.

3.5.1.1 Relying on theoretical propositions

Theoretical propositions are usually derived from the research questions, as they are the root for the data collection plan and therefore given priority regarding the analytical strategy (Yin, 2014). These propositions guide the analysis and are therefore a very close point of reference to what is being investigated in the analysis. The theoretical propositions lead the case analysis without distracting too directly from it. Such propositions also help distinguish between relevant and irrelevant data. In this research, the theoretical propositions were strongly held as a point of reference throughout the case study and the main analytical strategy.

3.5.1.2 Examining alternative interpretations or rival explanations

Rival explanations play an essential role in case study analysis, since they could turn out to be the actual explanations of a phenomenon. The methods applied in the case study have to allow for alternative interpretations. The research protocol also addressed rival explanations and urged their continuous and ongoing analysis. Following alternative interpretations can help reassure a researcher that he/she is on the right path in a case study when they are revealed to be false or not correlated. In this case study, all emerging rival explanations were followed (refer to the case study database) and documented.

3.5.1.3 Development of a case description

The development of a case description is usually helpful when there is too much unsorted information (Yin, 2014). In supporting a proper analysis, all types of descriptive figures and relational models were created from the results throughout the study in order to identify causal links (refer to the case study databank).

3.5.1.4 *Using qualitative and quantitative data*

Certain studies can include quantitative data, which is usually used in parallel to qualitative sources. According to the research questions of relevance here, no quantitative data was used in this case study.

3.5.2. Analytical techniques

There are five specific analytical techniques (Yin, 2014). The most preferred technique is pattern matching. Since there are no empirically based patterns nor dependent or independent variables, the outcome of the case study had to be predicted prior to data collection. When patterns coincide, the internal validity is “a fortiori” strengthened according to Yin. Miles et al. (2014, p.278) state that: “The human mind finds patterns almost intuitively; it needs no how-to advice. But patterns don’t just happen; we construct them from our observations of recurring phenomena. The important thing is to be able to (a) see added evidence of the same pattern and (b) remain open to disconfirming evidence when it appears. Patterns need to be subjected to skepticism - your own or that of others - and to conceptual and empirical testing (Does it really make conceptual sense? Do we find it elsewhere in the data where it was expected? Are there any counterexamples?) before they can represent useful knowledge”.

The second analytical technique is explanation building, which is essentially a special type of pattern matching and has the goal to analyze the data by building an explanation about the case. This technique is mainly relevant for explanatory case studies (Yin, 2014). Yin also states that explanation building is intended to stipulate a presumed set of causal links active in a phenomenon and explain “how” or “why” something happened. He also suggests that explanation building is better reflected with theoretically significant propositions, instead of only using a narrative form. Explanation building tends to be iterative in nature compared to simple pattern matching. The codes and fragments that evolve over time and result in categories consecutively combined into causal networks (Miles et al., 2014). The findings, in particular, the categories, are explained by causal fragments, which will then eventually expand into causal networks.

Final explanations evolve over time and are not fully stipulated at the beginning, but rather guessed at that stage according to the interview manual (refer to the case study protocol). Throughout the process, the case study is at risk of losing its focus due to the iterative changes it experiences. However, as Yin (2014) mentioned, a clear process led by the case study protocol supports effective research in this respect.

The third analytical technique is time series analysis. This technique presumes that a certain effect can only happen if the preset for it was adequate, and that other dependent effects also only happen when the other effect took place beforehand. Since this case study is not scientifically longitudinal, this technique was not used, even though the case study took place over a span of two consecutive years.

The fourth technique is the logic model. This technique matches empirically observed events to theoretically observed events in a cause-effect pattern. There are also organizational-level logic models (Yin, 2014) where events are happening on an organizational level with an organizational impact. This technique was indeed used in these case studies, because there are iteratively elaborated, immediate, intermediate, and ultimate outcomes or events that finally support the successful implementation of an innovation (refer to chapter 5 “Discussion of the results”).

The fifth technique, the cross-case synthesis, can only be applied in a multiple case study. With the help of word tables, findings in each case can be compared and gathered in a systematic way, from which cross-case conclusions can be derived. Such word tables display data from individual cases in a uniform framework (Yin, 2014) and form a very useful part of the case study databank, as stated by Yin (2014, p.167):

“An important caveat in conducting this kind of cross-case synthesis is that the examination of the word tables for cross-case patterns will rely strongly on argumentative interpretation, not numeric tallies... . A challenge you must be prepared to meet as a case study researcher is therefore to know how to develop strong, plausible, and fair arguments that are supported by the data.”

Finally, when looking at the hands-on analysis and how-to-interpret procedures for the interviews and the focus group, an inductive category building (Mayring, 1996) approach was

used. In a first instance, categories were iteratively developed through the analysis of the interviews in the first stage. These categories can include parameters, settings, or results in a cause-and-effect diagram that are equally named/tagged. In a second stage, all resulting categories are merged into meta categories and then visualized in cause-and-effect diagrams. The categories are then finally defined after a last processing and analyzing of all gathered data and material, in reference to the “procedural model of qualitative, content-analytical procedures applied in inductive category formation” (Mayring, 1996).

3.6. Outline of the case study report

3.6.1. Case study report

The core of the case study report is constituted by the obtained results. It is important in writing case study reports that the researcher cannot start early enough, initializing the case study report essentially with the kick-off of the case study investigation itself. There are different styles in writing, but all reports should read like a “thriller”, so that readers are captivated by it and continue reading. The writing method used in this thesis is closely linked to realist literature (Miles et al., 2014). Special attention has to be given to defining clear boundaries between the phenomenon and the context of the case study. Once it can be argued that any further research would not lead anymore to new relevant findings, it can be assumed the boundaries are set correctly according to Yin (2014). In order to assure that nothing said by any interview partners can be traced back to that person, the transcribed statements were anonymized; in some instance, even specific word contents or expressions are replaced by general wording in brackets, so that no inference can be made about what which interview partner said. Controversial phrases were partly also replaced and accordingly rephrased in brackets.

In order to preserve the anonymity of the interview partners, a number is assigned to each interviewee. The anonymized numbering of the participants of the focus groups (starting with a letter that pertains to each case study - A for skyguide and B for Swiss -, followed by a number from 20 upwards) differ from the numbers for interview partners (starting with a letter that pertains to each case study, followed by a number from 1 upwards).

3.6.2. Target audience of the case study report

The case study report can be addressed to several audiences and therefore have different contents and be different in style and content. In this research project, there are two companies forming part of the case studies. The case study report is presented to each of the two partner companies in a short, but precise report containing findings as well as other considerations and suggestions regarding the findings. In those reports, the findings are specifically meant for senior managers, with a focus on summarizing practical knowledge, with unnecessary academic contents kept to a minimum for these recipients. On the other hand, in this dissertation, the case study report is intended for an academic audience (in chapter 5 “Discussion of the results”).

As a conclusion, this chapter intended to explain the research method applied in this thesis. In the next chapter, the main results of the case studies are presented.

4. EMPIRICAL RESULTS

4.1. Introduction

The empirical results of this dissertation derive mainly from two sources, namely interviews and focus groups. Therefore, the findings obtained from these two sources for the two case studies are presented in separate sections, while the findings obtained from other sources such as documentation, archival data, direct observation and physical artifacts, are documented together in the section “Findings from other sources”. This chapter is structured so that each case is documented individually. The presentation of the results for each case study starts with the findings from interviews, followed by the findings from the focus groups, and ends with the findings from other sources. Furthermore, background information regarding each case study, such as the number of interview partners or the methods applied, is also provided as an overview.

As mentioned in the chapter 3, “Methods”, inductive category building was used in order to identify factors that confirm or negate theoretical propositions. Since some inductively built categories are dependant on each other, several categories appear under different propositions. Nevertheless, each category is explained only once even if related to several propositions. When contributing to other propositions, the category is referred too, but not defined nor explained again. In such a case “firstly defined earlier” is stated.

4.2. Findings of Case Study I

4.2.1. Findings from interviews

4.2.1.1 Findings regarding theoretical proposition 1

Addressed proposition	Method	Participants	Unit of analysis
Proposition 1: “The know-how of exploitative key players, who mainly focus on incremental innovation, is sometimes consulted by explorative key players when it comes to decisions regarding radical innovations“	Focused interview	14 (total) Named by „A1“ till „A14“: Including 1 from the first hierarchical level (sponsor of the project, CEO), 3 from the board of directors, 5 from the third hierarchical level, and 5 from the fourth hierarchical level. The above participants had active functions within the innovation project, ranging from being a sponsor at the top level of the hierarchy to a subproject manager with functional tasks within the innovation program	Individual level / Team level / Organizational level

Table 3: Case Study I /Theoretical proposition 1 - Overview of the interview

Source: Author.

The categories relating to the theoretical proposition are:

Categories	
Engaged exploitative key players	Exploitative key players which are engaged and involved by the explorative, implementation-leading personnel, when implementing an innovation
Guided explorative key players	Explorative key players which are guided in the right direction by the input from the exploitative key players who are involved in the innovation implementation
Improved risk management	Risk management that has been improved as a result of a previous situation
Improved understanding of Innovation	Exploitative players who understand better what an innovation and its functions are about
Elevated trust towards source	The trust towards a person that is telling something has been improved as a result of a previous situation
Determined decision building	Decisions made are sounder due to the integrity of the information

Table 4: Case Study I/Theoretical proposition 1 - Categories from interview

Source: Author.

Two central categories derived from the data obtained in the interviews are “**Engaged exploitative players**” and “Guided explorative players” (to be explained later). The players responsible for leading the implementation of an innovation program/project, later called

explorative players, were found to have an interest in including exploitative players in the process. One occasion of this was having to make decisions about radical innovations and evaluate/assess how they fit into the current system architecture of the company. Another reason is simply to engage and involve exploitative players in the implementation process because their knowledge on high-reliability-specific organizations is important in order to be successful with the implementation.

”to see where we are today and where we gonna go tomorrow, we cannot do a Big Bang, so we have to start where we are today to go to tomorrow, we have to do it evolutionary, we have to involve what we have today. At skyguide, 95% of the projects that we do are touching existing applications and equipment and it’s almost impossible just to create a project team and just deliver something”. - A5

The HRO environment sets a different challenge when implementing innovations. Old systems, processes, and applications are usually incrementally updated, amended, or replaced by newer, but similar ones. Plain radical innovation can rarely happen in such an environment. Nevertheless, when asking A5 whether the creation of VC (Virtual Centre) is a radical innovation or an incremental one, he stated that the innovation is radical, but the implementation can only be done incrementally. It was also found that the more an innovation touches on the exploitative side of operations, the more the frontlines are involved and taken onboard early on in the implementation process. A5 also stated that exploitative players have to be involved while designing the things to be implemented and while doing the prototyping. This would lead to buy in of the exploitative players, acceptance and as well commitment.

“What I heard very often is that the guys (explorative players) working for the VC have absolutely no clue about the operation, because they are externals and not specialists. So they (the exploitative players) had strong doubts that they are going to create something very useful. I think that step by step, we have tried to improve the influence coming from the ops (operation / exploitative players) and more and more people, exploitatives, are working towards the exploratives. First of all, it was accepted by the exploratives, they had absolutely no problem with that, and secondly, we have found the right exploitatives which were enthusiasts and able to really start running the engine. I think we have a very good momentum in this respect today, and I also think that people have recognized that it is now the operations in the driver seat and shaping the VC. It is not the program

managers and project managers, it's really the operations people influencing the program". – A14

Engaged exploitative players can be people from operations at the lowest hierarchical level, as well as their supervisors.

"There are very important players ... the line managers. ... we are talking here about the program organization, but also the head of operations department, for example, or the head of the technical department, to name two important persons, they are absolutely key. Without these guys, you can forget everything". – A2

As stated above, there are some key players who are critical for a successful integration of explorative activities into exploitative ones, namely decision makers from the operations department whose employees are working towards the implementation of innovations. According to A6, exploitative people, by nature less innovation-embracing, can also be actively involved by being formally assigned to the implementation of an innovation and automatically take over ownership. Taking ownership of an innovation was found to directly and positively influence the buy-in of such exploitative people and results in keen interest on their side in the implementation process itself. Interaction between exploitative and explorative players led to a positive influence regarding the guiding abilities of the explorative players, since they could take a benefit out of that relationship- Respect also grew towards the exploitative players and their contributing know-how.

Another category emerged, i.e. **"Guided explorative players"**. Explorative players that are implementing an innovation should accept advice, listen to exploitative players, and let themselves be guided to a certain extent to assure a proper implementation. A1 was asked about what kind of activities are supporting the implementation of innovation within the exploitative community and the answer was the following:

"If the individual wants support from the operations community (exploitative players), the best thing you can do is to have for example a console, a test console, ready in the ops test room (with the new technology) where they (exploitative players) can, during their breaks, sit and familiarize themselves with some aspect of this new technology, and that's how you create buy-in. There, you also get probably the most valuable information

regarding how practicable is this thing (technology) in real. On the other side you also hear a lot of things that the innovation team probably doesn't want to hear because they say "we do it like this and that, these are our rules, you must build your technology around these rules"”. – A1.

Thus, explorative players should gratefully accept the advice of exploitative players and let themselves be guided, simply because it improves the innovation and its applicability. A8 mentioned also that exploitative players who are first confronted with a new radical innovation, in a first instance think about the problems and practices regarding the old system and specifically how it is loaded and stressed. A8 summarized that exploitative players are absolutely capable of telling the explorative players about potential issues and any poor fit of radical innovations, simply because they know how the legacy technology is being used and stressed. It was also observed that if explorative players let themselves be guided, this has a positive effect on mutual respect between the two sides.

“If you go and make a road show (with your innovation), and you get feedback, and you are able then to show later on that feedback that you have got, at least, analyzed, maybe even not implemented, but make it visible, make sure they see that you are not just coming and making your road show and the papers you are using to write down the questions landed in the trash bin directly. They really have to see that people on board think about it, analyze it, take maybe something, provide feedback, refer back to what they have got. There you can create trust. You go back there and they see, ohh, he was here one year ago, all he got, he took it from us, he used it, analyzed it, he rejected maybe 70%, but 30% he used to change his mind, the way he wanted to go, that creates trust”. – A8

It seems key to listen and take the inputs from exploitative players seriously and then feed the actions back to make the changes visible. This implies that explorative key players should let themselves be guided by exploitative key players to some extent. This guidance directly and positively influences the appropriate evaluation of a technology and therefore also improves risk evaluations.

Another category is **“Improved risk management”**: Throughout the case study and while interviewing key players, it became clear that the risks that come with innovations can be

mitigated when exploitative players are part of the knowledge gaining and information loops before decisions are made. A lot of times innovations that replace old technologies are prone to be weak or critical on the same exigencies as the old technology. That's why exploitative players are familiar with such weaknesses already and therefore can estimate where weaknesses might be hidden in the innovation. For exploitative players, it is important to understand an innovation, not just with a view to being able to give accurate feedback whether or not it could be dangerous later on, but also in order to overcome people's fears regarding it.

"... we need to involve the people that do the exploitation later on quite early on in the project to have them involved and make sure they get the knowledge, experience. That stuff that we have to do, it's dangerous stuff ..., so we have to do it on a really step by step basis and we have to make sure that we have a learning curve." - A5

Therefore, improved risk management is positively affected by engaged exploitative key players and also has a direct positive effect on the guidance of explorative key players when implementing an innovation.

Having to interact with each other and listen to each others' statements in formal or informal events and talks has a positive effect on the understanding of an innovation and its terms. This gives rise to the category **"Improved understanding of innovation"**. What seems to be done at skyguide is that the efforts taken regarding the innovation are being communicated, and certain events like a brown-bag meeting take place, where first-hand information is shared not only with the exploitative players, but all of the interested employees.

"What we are doing is, from a strategic point of view, to communicate what we tried, what we intended to do and the reasons for this. We publish it for all the staff of skyguide. We invite them to meetings, meetings where the CEO or the Technical Director or people from the inner circle give the information. We offer them a lunch and something to drink, so that they are coming, and we answer questions that might arise. At the moment, my feeling is that the people are OK with the direction we are going but, nevertheless, they ask sometimes questions which you thought had been answered many times before." – A6

If exploitative players understand what the new technology can bring for them as an advantage and benefit in terms of efficiency, reliability, safety, less workload, or even in the sense of

enjoyment or lower costs, they can become supporters. Thus, having those formal gatherings can be important to genuinely transport the meaning and the sense of an innovation.

On the other hand, having worked transparently and with mutual respect, this is said to get acquainted and improve the trust towards each other. **“Elevated trust towards the source”** is another category with distinct importance. As exploitative players are sometimes anxious about an innovation, especially when they would like to conserve the status quo, greater trust in the explorative players can be gained when they are able to bring innovations down to an operational level and prove that they are able to deliver what once seemed a far-fetched idea.

“You have to prove it, you have to deliver. Then people start to believe in you ... you have to show it works, then they start to believe in you. Otherwise it’s also maybe some history (in skyguide) where a lot of things were promised, never delivered though and – yeah – you have to show it works”. – A7

Trust towards the source or between two parties depends considerable on how knowledge is appreciated by the person receiving it. When talking about key players, the term ‘trust’, or the building of trust, was mentioned several times. Trust in the source seems to be a major issue at skyguide. Engaged exploitative players do not only have a positive effect on iterative communication between them and the explorative players, but also on building up trust between them, which is again important to improve the understanding of an innovation in the sense of believing in the source that is giving information about it. Trust is built up over time, by spending time together and proving each others’ sincerity. When trusting the source of an information, the information is taken as fact. Gaining that trust is very important and a key element when trying to convince the exploitative workforce about an innovation that is changing their work environment. The election and engagement of trusted key players or the build up of trust in an innovation project is said to have essential impact.

“ ... in a project, you have to adapt what you deliver at the end, so that the people feel most comfortable with it, and that’s why it is so important that we have people who are going to work with the tool at the end, in the project from the beginning. That is what we are doing and these exploitative people, they influence the project a lot, and they can also then transmit this influence to their colleagues and become somehow opinion leaders. Having trust in a source depends also on the source itself”. – A14

and

“Here of course, very good stakeholder management and stakeholder engagement strategy, a very good selection of the stakeholders you talk with, opinion leaders and others is needed – clearly that’s really one of the key factors. Another is that you have to create trust. If you have no trust at all anywhere, you can tell them whatever you want, it is not working! ... information is going to a couple of people, to a couple of opinion leaders, key players, who finally somehow act as relays. ... You see that typically in Geneva, maybe someone who is a technician on one side, but a well-respected technician for the controller, because in his way of doing projects he was every time 50/60/70% of his time with the controller and not with the developers, and he is typically one of these relays that transfer this finally into everyday business. ... typically knowing each other, a person that is trusted, who is able to bring that into the organization, who can act somehow as a focal point”. – A8

Said opinion leaders should be identified and engaged, maybe even absorbed by the project team if possible and their influence guided and used. Being able to communicate from the perspective of the responsible person implementing an innovation and transmitting the knowledge and capabilities needed for the innovation is therefore important. Improving the understanding of an innovation is also positively dependent on the trust in the source. Trust is found to have a key role in an HRO. It is very important to have the right person in a project, i.e. a well-known person, if possible an opinion leader and well-trusted person leading the implementation of an innovation. Such a person can directly improve and foster the required knowledge within the company, simply by being listened to by the workforce. Trust is found to play a major role, not only from the perspective of the exploitative players or the engaged exploitative players that depend on what is being said by the explorative players, but also vice versa. Leaders and decision makers depend on the information they receive, and trust is significantly important. When exploitative players trust the explorative players, the information and knowledge they receive lead to an improved understanding of the innovation.

Having an improved understanding not only within the workforce, but also within senior management leads to better informed decision makers as well and therefore to better **“determined decision building”**, another category. A5 said that he/she needed the input of

exploitative players for making decisions; he/she needed to have their recommendation and know where they see risks and which standards need to be followed. Above all, he/she stated that he/she wants to understand how the innovation works. Informal channels are used as well to form an opinion or to prepare a decision. A11 explained how he/she forms his/her opinion:

“it’s more informal. I have been quite long in the business, I get used to formalizing a few things, but now with my experience, I am going and dig first, then I have a phase of structuring and looking and thinking about how does it go. And then I try to structure a little bit my approach while looking at it differently, so it’s a mix between non-formal and formal, and then I try to make up my mind on a piece of paper – and if I have to write a report, then I will write a report of the structure. In my function, I am really an implementation manager and my forces are more for implementation ...”. – A11

Forming one’s opinion was found to be an individual informal process whereas, the decision making then is more formal, with meetings and official meeting minutes. Having had informal talks and letting oneself be influenced by other opinions does have a direct positive effect on broadly accepted decision making.

4.2.1.2 Findings regarding theoretical proposition 2

Addressed proposition	Method	Participants	Unit of analysis
Proposition 2: “The know-how of explorative key players, who mainly focus on radical innovation, is sometimes consulted by key players involved in exploitative activities when it comes to decisions regarding incremental innovations“	Focused interview	14 (total) Named by „A1“ till „A14“: Including 1 from the first hierarchical level (sponsor of the project, CEO), 3 from the board of directors, 5 from the third hierarchical level, and 5 from the fourth hierarchical level. The above participants had active functions within the innovation project ranging from being a sponsor at the top level of the hierarchy to a subproject manager with functional tasks within the innovation program	Individual level / Team level / Organizational level

Table 5: Case Study I/Theoretical proposition 2 - Overview of the interview

Source: Author.

The categories concerning the theoretical proposition are:

Categories	
Engaged exploitative key players	Exploitative key players which are engaged and involved by the explorative, implementation-leading personnel, when implementing an innovation
Guided explorative key players	Explorative key players which are guided in the right direction by the input from the exploitative key players who are involved in the innovation implementation
Improved understanding of Innovation	Exploitative players who understand better what an innovation and its functions are about

Table 6: Case Study I/Theoretical proposition 2 - Categories from interviews

Source: Author.

Concerning this proposition, **“Engaged exploitative players”** and **“Guided explorative players”** are also central categories, as proposition 2 essentially only contains the reverse flow of knowledge compared to proposition 1. Forthright exploitative players who are not afraid of innovation and its consequences might consult explorative key players in order to have a better understanding of radical innovation. According to A14, the exploitative key players also want to get input and see what an innovation is capable of. They are also said to be interested and forward-looking about what might be the state of the art in the future and its according impact on everyday operations. Some are also interested in other radical innovations in order to find out whether these could be used elsewhere, maybe for incrementally improve a process. As A2 stated, sometimes ideas can be gained from radical innovation, e.g. concerning how something could be used to improve a current technology or how an advantage could be gained from that innovation for routine business.

“What are new models that can be brought in? What can be new ways of working that can be brought in with this technology? As long as you just know a new technology without being able to give the people the direction that it can create benefit for them, it is difficult, so here you rather speak about business models, saving potential, or improvement potential for the operations. As soon as you switch to the exploitative players, they then go much deeper into detail in the daily operations where, very often, the devil comes in, the devil in the detail comes in and says: “Yes, but how do you manage quality of service and....”. – A2

and also:

“It can be a little, small way of doing things, it can be just the way of reorganizing things, but for them ... they (exploitative players) are bringing in some ideas, even though they don't know exactly how this really works in reality”. – A8

It was seen that the interplay between the explorative and exploitative players comes with the benefit that the exploratives are guided and steered by the knowledge of exploitative players, helping them implement innovations thoughtfully, and that the exploitatives have a say in the technologies used in the future. Engaged exploitative players and guided explorative players therefore positively influence each other when implementing an innovation together. A7 confirmed similar reasons concerning why exploitative key players consult explorative key players when he was invited by exploitative players to contribute his knowledge to their exploitative department. It is also worthwhile to mention that evidence was found much less and with less intensity if exploitative key players contacting explorative key players to be consulted by them. The effect from such interactions was that the exploitative players had a better understanding of the innovation itself and sometimes found other applications for the innovations in more incremental form.

Such better understanding relates to another category, **“Improved understanding of Innovation”**. Most interview partners named the reasons for contacting explorative players in agreement with the following statement:

“To get the full picture about an innovation, to get different perspectives, to get a feeling about it, how it could be used, how it could be implemented, and what the drawbacks and limits are” – A11

When exploitative players are consulted by explorative players, it is said to be an opportunity to exchange views, exchange opinions and, above all, knowledge. Exploitative key players are sometimes anxious about innovations, because they could change their immediate environment. Explorative key players can contribute to a smoother implementation by listening to the exploitative players' input and concerns, apply change management tactics, and mitigate their anxieties gradually.

4.2.1.3 Findings regarding theoretical proposition 3

Addressed proposition	Method	Participants	Unit of analysis
Proposition 3: "There are some key players that support or hinder the integration of explorative activities into exploitative activities"	Focused interview	14 (total) Named by „A1“ till „A14“: Including 1 from the first hierarchical level (sponsor of the project, CEO), 3 from the board of directors, 5 from the third hierarchical level, and 5 from the fourth hierarchical level. The above participants had active functions within the innovation project, ranging from being a sponsor at the top level of the hierarchy to a subproject manager with functional tasks within the innovation program	Individual level / Team level / Organizational level

Table 7: Case Study I/Theoretical proposition 3 - Overview of the interview

Source: Author.

The categories concerning the theoretical proposition are:

Categories	
Strong leadership	Leader who actively take the lead with a strong hand
Transparent, receiver adjusted and fast formal communication	Transparent, timely, formal, official communication about events
Side changers	Players who were once explorative and then became exploitative or vice versa
Change resistant exploitative players	Exploitative players who are resistant to change and do not endorse new ways of doing something

Table 8: Case Study I/Theoretical proposition 3 - Categories from interviews

Source: Author.

“**Strong leadership**” features as a category, since important and large innovation projects are in need of strong leadership and straightforward, comprehensible communication that starts at the top management level. Explorative players, usually the ones leading or carrying out an innovation’s implementation, are in need of strong leadership by the governing sponsor.

“It starts of course with the CEO. If the CEO is not 100% behind this program, then it will not happen. Then below the CEO, it needs the commitment of the main departments concerned or the heads of the departments – it needs a dedicated program team which is convinced about the objectives to be achieved – yeah. I think it should be, at the end, the

whole company that contributes to it and that the whole company sees the added value and people need to be convinced that this is the right thing to do”. – A13

A leader who bluntly communicates positive and negative news has to be confident and sure about the content. Such a strong leader telling the truth usually only influences the informal channels that would be active in any case. At some given time, decisions also have to be made, which is not always easy and needs strong leadership. Above all, a leader has to be a role model and shepherd, keeping people together, especially the fanatic explorers who could deviate too far from a specific innovation. Communicating sound data and knowledge between the leader and the workforce is not a one-way, but a two-way flow of communication. For senior managers, it is also tremendously important to receive sound information with regard to an innovation and to therefore simply listen to what is being said by all the players involved. According to A4, trust can be built up when someone has proven himself as a capable manager. It is critical to elect the right person for an important position in an innovation program. It can be said that strong leadership has a positive influence on transparent and fast formal communication, since communicating, in particular after setbacks and bad news, is not easy. A leader can communicate them also, to some extent, to be perceived as credible.

Formal transparent communication was found to be very important, implying another category named “**Transparent and fast formal communication**”. Transparent and timely formal communication is important, because it is used in a first instance to spread knowledge about an innovation and the progress with its implementation. Formal communication is said to be important, while informal communication is equally relevant. Both have in common that information is shared and knowledge gained by the participants. The informal channel is also more likely open to questions when something was not understood correctly at first. Informal channels also support the confirmation of one’s own understanding of something, as people can ask for verification, without having to do so in public or in a formal meeting. In the interview, A3 and the interviewer had the following conversation:

A3: “...There are some positive aspects. Some of them have to do with the information flows where different people start to see different links of course and see the dependencies and interdependencies. My view is that, because not enough information has been flowing or not in a comprehensive and digestible format, we miss a lot of the links that we should be making or that other people should be saying, but the more

communication, the better the situation undoubtedly; and the more open and honest the communication, the better the situation is...the problem with informal flow is that you are never quite sure who knows what information, unless you have distributed it yourself, and that it is the risk with the informal side, that sometimes people miss a piece of critical information because you think you included everybody, but you have forgotten somebody, whereas on the formal side all of the necessary people get included, and I would like to see a significant increase in that. Well, I am on that sort of person, including the formal and informal communication to all key stakeholders, including the engineers and the controllers amongst them, for example. Because the information and explanations of what we are trying to do, what is actually going on and what the plan is, is inadequate to them and that endangers, of course, the future implementation.

J1: This is happening now?

A3: Starting to happen, it is still definitely insufficient, so there is some good communication coming from there, there is a little bit of communication coming from the corporate communications guys, but from the corporate communication team, there needs to be a lot more information about what we are trying to do, why, and how we are doing.

J1: What do you think, which one is more important, the formal or informal flow of information in order to be successful?

A3: For the success of the VC (Virtual Centre), informal, by a very long shot. But my personal perspective on that is that it needs to have a backbone of formal communication, so that everyone can keep reverting to the same line on the official information, even though everybody has their piece of information and their different perspectives on it”.

The importance of the communication was mentioned several times, both formal and informal. Formal communication serves different needs than informal communication, but both should be aligned and used. Having timely and transparent formal communication in the implementation of an innovation thus seems to have a positive influence in the sense of having an improved understanding of an innovation within the workforce.

It was discovered that some players who were explorative later became exploitative and vice versa. Players that, for example, were once exploitative and then implemented an innovation and became explorative can span the boundaries between the two sides (i.e. explorative and exploitative). They are categorized as “**side changers**”. Side changers can also develop in the opposite way, starting as explorative and becoming exploitative by taking the implemented innovation over into everyday business.

“... People who move to other positions because of the new technology giving them an interest in moving somewhere else. Here is the typical example by the way: He was first a controller, an ATCO (Air Traffic Controller), but really not a typical one (laughing). Then he was in a complete exploitative function and, now, with the attempt of the company to change mindsets, a new job is available for him. Three years ago, he would have said: “No, I don’t go there, I am absolutely not interested in going there, that’s not my life”. Now, he is saying, “Yes, I see how they changed, I wanna be one of the change agents as well.” And he is moving into such a position (explorative function)”.– A8

Engaged exploitative players also have a positive effect on side changers, as they open the doors to becoming engaged in an innovation. A characteristic of the HRO environment is the innovation-averse culture, since innovation can endanger safe processes that have been established and running for years. There especially, it seems to be significantly important to understand the everyday business and current processes when implementing anything new. Regarding the question of which types of key players support the integration of explorative activities into exploitative ones, such supporting players need to have the ability to be contextually ambidextrous players:

“A key player would be someone who is explorative, but with the background of an exploitative player. Since with an innovation at skyguide, you rarely start from a blank sheet, and we are always transforming the product from where we are today to where we want to go. Such a player with experience is very important in order to make realistic goals and target for the future. We are not inventing something new out of the blue in this environment. We are always transforming ... it is based on what we had in mind for years. It is not inventing the iPhone, ok, it’s something different, it’s really transforming our existing or legacy environment into something new, better, more efficient, safer, but it’s always a transformation process. It’s never from scratch ... A lot of people in my

organization do not have the mindset to project themselves ten years ahead and to identify what are the challenges. Some people in my organization have this ability. They can take into account what they have, but also be capable of driving this change, for a vision, for a target. ... To have someone inventing the future without any concerns about the current situation produces nothing useable. So we are really with this mixed personality, with the best people contributing to this type of project". – A12

Key players that support this integration process not only include the ones that change sides physically, but also the ones who are also capable of changing sides mentally or of projecting themselves into the future without forgetting the current technology. Such players are said to be extremely supportive, because they are able to talk both sides' (i.e. explorative versus exploitative) language, understand both sides, and are therefore considered credible in what they say.

Players that are known to be hindering innovation are found to represent the vast majority of exploitative players who are afraid of changes, forming another category, the **“Change resistant exploitative players”**.

“Hindering key players are these: People who are by nature reluctant to change. This is the biggest risk for such a program, the people who stick to the legacy. ... Simply spending all their time explaining why something can't be done. This is a typical slowing down behavior. It's also people who listen quietly and once the decision is made, simply keep on doing the things they have always been doing and don't contribute to the process". – A4

Said players impede the fast and lean implementation of an innovation, since they essentially negate the potential of the innovation in their minds and ,later on, physically as well. Nevertheless, these exploitative players have been trained throughout their professional lives to be change-averse; they are trained to go by the book. They were selected and trained not to be creative and innovative, which makes it a special effort in such environment. Following the interview with A8, he/she stated that it is very difficult to lead innovation projects with this “status quo loving staff” (Case Study Database, 8.5.2014). Answering a follow-up question of the interviewer, about the fact that exploitative players mainly hinder the integration, A14 further said:

“Ahh, this is maybe too strong, I mean if we talk about these two guys here As soon as they see the benefit of the new technology, they are the first to support it, they want to have it first. – A14

It was found that players in an HRO are possibly as afraid of change as people in any other business, with the difference that safety is at stake. The special circumstances in the management of change therefore need to be considered and applied.

4.2.1.4 Findings regarding theoretical proposition 4

Addressed proposition	Method	Participants	Unit of analysis
Proposition 4: “The interactions between different key players involved in explorative activities and exploitative activities have positive spillover effects with regard to the implementation of technological innovation”	Focused interview	14 (total) Named by „A1“ till „A14“: Including 1 from the first hierarchical level (sponsor of the project, CEO), 3 from the board of directors, 5 from the third hierarchical level, and 5 from the fourth hierarchical level. The above participants had active functions within the innovation project, ranging from being a sponsor at the top level of the hierarchy to a subproject manager with functional tasks within the innovation program	Individual level / Team level / Organizational level

Table 9: Case Study I/Theoretical proposition 4 - Overview of the interview

Source: Author.

The categories relating to the theoretical proposition are:

Categories	
Iterative communication	Sharing of information that results in feedback in turn can result in feedback
Deliberate listening	Listening thoroughly to what is being said and trying to understand it
Accurate transmission / spreading of knowledge	Knowledge is being shared in its true substance
Supported fast / focused innovation	Effective undisturbed implementation of an innovation

Table 10: Case Study I/Theoretical proposition 4 – Categories from interviews

Source: Author.

Considering this proposition, the identified categories of engaged exploitative players and guided explorative players imply an inherent type of interaction which is a predecessor of “**Iterative communication**” with its positive, mutually self-fertilizing effect.

Engaged exploitative players on a regular basis offer stronger guidance for explorative players regarding the innovation in a sort of a sounding board that reflects the innovation critically. Transforming criticism into action and coming back with a better version, in particular having an iterative exchange of criticism, was said to have substantial impact on a successful innovation.

“The exploitative people, they have a tendency to shoot down innovation, to stay where we are today and as long as you cannot come in with a certain maturity in the ideas to them, you are not able to sell them, to explain them, to communicate to them also what benefits they can get out of it. On the other hand, they really add value when thinking about threats/issues the explorative people absolutely do not see, so this mix is really needed. But in order to have a good discussion with the exploitative people, you really have to get up to certain level of maturity”. – A8

The act of explorative players involving exploitative players brings two antithetic types of people together. One type tends to come into the office in the morning and does not really know what he or she will be facing during the day, with the proverbial creative chaos on their desk, while the other one likes to come to work exactly knowing what to expect. The second sort also likes to have, figuratively speaking, a pile of paper on the left side of the desk in the morning that wanders to the right side in the evening. Making those two types interact with each other during the implementation of an innovation not only makes them acquainted with each other, but also brings them closer to each other’s specific way of thinking and acting. A factor that is hindering iterative communication between key players who could fertilize each other, according to A12, is the strongly vertical organization, or the poor horizontal connections (Fayol’s bridges). Therefore, communication goes up and down, but very rarely from side to side, which hinders the spreading of knowledge inside skyguide. Some interactions, but not all interactions between explorative and exploitative players, are iterative, as the explorative innovation implementation leading players listen to what is being said by their exploitative peers, do what they are told, and then come back to verify the results. Such iterative interaction between the two types of player,

which also helps to build up trust, is a strong supporter for achieving positive side effects that support the implementation of technological innovations.

“You have a mixture of different things, you need the open minded to get the point and then you need the very structured people to get the structure out. If it’s something like the VC, you need a bunch of people you have to communicate with, you have to make sure that people are working on the different elements, and then you have to bring the different elements together and make sure that they are coherent together, so it’s an iterative process. You are not coming from a waterfall-model, it’s really iterative and, through the interactions, you get more mature, and you then get a clear view of how the future will be shaped, and it takes time. ... I am very supportive of this kind of approach, because in our field, in which we have an integrated system, it is very complex, and you have a lot of interactions and to achieve the right maturity and safety level you need this”. – A11

Iterative communication also tries to make the exploitative players understand that they cannot have everything they want, but that it is necessary to find, through the discussions, a leveraged optimum, where the parties involved can state what are the go’s and no-go’s items and this finally finds its way into the result.

“Deliberate listening” is not only directly related and affected by iterative communication, but it also concerns very valuable contents, since it will or can be fed back if iterative information is brought back into the loop. The informal channels also serve as a feeder of important information for the explorative players who can then gain specific knowledge and insights into the sometimes unheeded world of the exploitative players.

“... there are certain activities which become critical, one of them is the whole safety discussion, and it’s about making the safety assurance necessary to ourselves inside skyguide that this is going to be OK, and on the side of that making it OK with the regulator (FOCA/Federal Office for Civil Aviation), the primary assurance function is to ourselves. ... there are a number of behaviors which would make this work and some which will make sure this doesn’t work. Behaviors that make it work are things like talking positively and behaving as if we are sure of the success of the VC, especially amongst the key players, great listening, listening to everybody what they say and what is

coming up, especially on the informal channel so that we don't miss those signal that tell us: "We have a problem". I'll give an example now: I am hearing again and again that at the end of 2016, the first part of what we are trying to do is not feasible without an enormous reduction in scope. At the moment, this is not formally listened to, because every time it comes out, the answer is: "You have got to deliver that by then", OK, so that's one great example of a reaction from the very top level management that means that people don't bother anymore telling us what the problems are, because clearly top management is not interested. So, listening is going to be very, very important as well". –

A3

It is the leader who listens more to what is being said and also what is being asked who can then give lots of background knowledge about how an innovation is understood or perceived. This should happen on a formal basis as well, e.g. in brown bag meetings, on road shows, and whenever possible. Deliberate listening not only positively affect the supported, fast and focused innovation, but also the guided explorative players.

Accurate and sound information about an innovation is found to be important both from the top down and from the bottom up. The exploitative workforce should not receive negative gossip or be exposed to rumors that are hindering an innovation's implementation. Vice versa, the senior management also depends on accurate information from the experts in the lower hierarchy in order to make the right decisions. Therefore, the **"accurate transmission / spreading of knowledge"** emerges as another important category. Players that can accurately transmit or spread knowledge become key players. This can also concern negative content, when such players with informal channels act as whistle blowers with good intentions, e.g. when some innovation is being embellished in how it is presented to top management. Again, top managers depend on the information they receive from the experts.

"... although he is a good senior manager, he is also a senior manager with a maverick tendency and whose desire to do the right thing is greater than his desire to cover his ass, which means that if something needs to be said, and he really feels it needs to be said, he'll say it even if it maybe not so good for his career or anything like that. And I know and I trust him completely and I can't imagine that this is ever changing, so now that he is going to the VC program, he will continue to do that and, I suppose, there will always be a lingering loyalty to me and the operational department, which maybe doesn't exist

for many of the other people in the program itself, but that's inevitable as well. So that's the first part of the answer, a little bit of background there, and, if you like, just to continue that parenthesis, I have taken one of my very senior managers ... , so that is one of my top three guys and put him in here, instead of managing (naming the department) because I think it's that important and I think the relationship to the FOCA and the challenge is important. ... (naming another person) is another absolutely key person. Without him driving all of this in the right direction and being able to say "I do accept, I do not accept" and to shape the direction of which things are going. ... they don't attempt to make things look or sound better, they just say how they see it". - A3

The accurate spreading of knowledge is positively influenced by greater trust in the source, both top-down and bottom-up. If an innovation is well understood, this directly influences the accurate transmission and spreading of knowledge.

“Supported fast and focused innovation” is a very critical category. It is directly affected by deliberate listening and strong leadership: Listening helps to understand the other person with their issues and enables people to talk the same language according to A9. All sides' communication with each other, exploitative with explorative players, top management with shop floor workers or transversely, needs people to be able to talk the same language to understand each other.

“ ... we have an example here in Zurich. We have or we are about to implement stripless system for the ATCO's in several steps, five steps. And with the second one, we implemented some new functions, but we said at the same time, as a mitigation action and in order to be safe and close to yesterdays operation, we keep the paper strips, and we go into operations with that and all of a sudden. Discussions between the Head of ACC (Area Control Centre) and the ATCO's showed that basically, it would be possible to work without the strips. So, they were even able to form their side from the bottom, from bottom up if you want to say so: "OK, this new feature is really great and we are happy to get rid of the strips!" and that's why we put in the program now for step three, and additional action in order to make sure, in December this year, that we can get rid of the strips one year earlier than it had been planned in the program. So, that was kind of such an effect. ... with the implementation of the steps, we were very conservative and we thought, well, it's gonna be two big steps if we, at the same time, throw out the strip

handling and, finally, the ATCO's were so comfortable with the new situation that they said: "We don't use the strips anymore," and this basically is the best that can happen because then you have full buy-in, it comes from their side". – A14

When usefulness is recognized and the exploitative workforce sees the benefits, the dam seems to be broken, to use a metaphor, and the innovation finds a way more easily and without much resistance from their side.

4.2.1.5 Findings regarding theoretical proposition 5

Addressed proposition	Method	Participants	Unit of analysis
Proposition 5: "Key players support the integration of explorative activities into exploitative activities through informal information interactions"	Focused interview	14 (total) Named by „A1“ till „A14“: Including 1 from the first hierarchical level (sponsor of the project, CEO), 3 from the board of directors, 5 from the third hierarchical level, and 5 from the fourth hierarchical level. The above participants had active functions within the innovation project, ranging from being a sponsor at the top level of the hierarchy to a subproject manager with functional tasks within the innovation program	Individual level / Team level / Organizational level

Table 11: Case Study I/Theoretical proposition 5 - Overview of the interview.

Source: Author.

The categories concerning the theoretical proposition are:

Categories	
Accessible informal organization	Having access to informal key players that can influence the informal channels
Aligned informal communication	Degree to which formal communication matches informal communication that is taking place
Direct informal channels	Having informal channels between players without a formal, internal or hierarchical connection.
Regulations	Laws from the FOCA and the ICAO (National and International Civil Aviation Authority)
Positive lobbying	Positively advocating for something
Gain momentum	To be well received with an idea/innovation by the majority of the employees

Table 12: Case Study I/Theoretical proposition 5 - Categories from interviews.

Source: Author.

Being able to establish access to the informal organization is another key category called **“Accessible informal organization”**. The informal sharing of information is considered important, as already discussed. The informal organization is powerful. Since the informal organization is not formalized, there is basically no formal access to it, only informal and unofficial access. What was unknown before the case study was the genuine force of the informal organization. How important A12 considers it is stated below:

„Enormous, enormous! The majority of the best moves we have made into the explorative dimension have been done because the people were able to develop these informal contacts. ... to build it up (acceptance). In this explorative role, you have to invent new ways of thinking and to invent new ways of thinking means that you go out of the classical framework”. – A12

When the exploitative players manage to infiltrate the informal organization, they become familiar with what is being talked about an innovation, off the record. This enables explorative players to identify differences between the formal communication and information on the informal side. Having access to the informal organization, usually through exploitative players, substantially supports the alignment and controlling of the flow of information and, of course, opens doors to informal channels where the influence could be exerted as planned.

Here, another category, **“Aligned informal communication”** emerges. Having aligned informal communication means that the informal communication does not deviate from formal communication. Transparent and fast formal communication has a positive influence on aligned informal communication, since it is a preempts informal contacts. In order to align the informal organization, this is said to be supported by clear transparent communication on one side and by not giving rumors space to develop on the other side.

Having access to the informal organization enables one to receive meaningful information about how an innovation is being perceived, so that one can try to either correct and align informal communication or otherwise adjust formal communication. Both lead to aligned informal communication.

“...it’s very important that you also control the informal process of the company or when you try to influence it, control is the wrong word, because flows of information stop somewhere in the middle, and you don’t find it out until you have either damage or you find it out because of a certain situation, and we have that point right now, where I find out that one organization is just not giving the information in a adequate manner to the EMPLOYEES. So, it stops at the respective manager’s level ... and I find it only out because I have informal discussions with employees. That’s why I say you need the formal structure but you have to have an informal process and also relations with the people”. – A2

Informal channels also have the function of verifying formal information by skipping one or more hierarchical levels. It is said that the informal flow of information works more effectively than the formal one.

“I think it’s cultural, when the information gets presented to the EB (Executive Board), it’s been cleaned up and sanitized, so that all of the spots and blemishes are no longer visible. The make up is all over the reports, and I find that deeply unhelpful and actually the EB finds it deeply unhelpful, but our company seems to be incapable of showing what’s under all. So to give you an example of that, we have had a fairly disastrous project which started four of five years ago, but they took quite a long time to come to our attention, and you see in what actually the people at the bottom are saying, “this is a red light (traffic light system), we have a problem, big risk”! And somewhere on the way up, it changes through orange and yellow into a green light, with a little bit of yellow in it. And then you think why does that happen, and it’s presumably because the culture in the company was created a decade ago. I am not talking about the people even who are involved now, although some definitely have got some responsibility. But they created a culture were you don’t bring bad news to the top management. Of course that is one of the worst things you can possibly do, in the context of the VC; this is a guaranteed failure of the VC if we don’t know early enough what’s going wrong. This is one of the things that make this person here so important, because I trust him, he is able to come to me and to say: “It is not good”. And he would never color things differently, whereas many other people get sucked into the cultural norms that exist then just sort of say:” It is not so bad”. There is also a history at skyguide of never dealing with underperformance. So if people failed to deliver what they are supposed to deliver, skyguide metaphorically

shrugs its shoulder and just carries on. That is changing, it has been changing for the last couple of years with a much better project process, with (naming a person) coming into his role. That is one of the reasons why we put (naming another person) in there. But the formal ways still masked a lot of the real information you need to have to make the critical decisions at the top level, this is why the informal ones continue. Every time we have a formal one that doesn't agree with the informal, I speak up every time and say: "why is it that I hear this and you are telling me that?" There is always a plausible explanation but not good enough, so there is an extent to which of course inevitably it is always going to be like that, but I would like the gap between the information that comes up informally and the information that comes formally down to a minimum. At the moment, they are often quite a long way apart". – A3

Formal and informal information should be aligned if possible, bottom up by delivering the right and accurate information, and top down by transparently telling what is occurring. Having them aligned, in particular by having the right information in the system, supports the accurate transmission of knowledge about the innovation and therefore the understanding of it. Another positive effect is the improved trust in the source because of the congruent messages.

“Direct informal channels” were identified as another category, since they were found to be used by key players in several ways. One was to influence opinions about an innovation and therefore influence the decision building processes of others. A6 said that informal interactions have an even greater influence on the success of an innovation than formal interactions. Following my question of why it has so much influence, he/she answered:

“It's taken for granted and I give you an example. We just retired one member of our board of director... He was responsible in the company as a director ... If I encounter problems and I give him a call and say: "Look ... I have this and that question, can you give me some advice", or I travel to Bern to see him directly, this is informal and by doing so and sharing the information, you prepare for the decision later on, because he understands, because later on you have to present this case, you will have to present your decision and you will have to have the OK from this director, so if you go along with this informal stuff and ask for advice, he positions himself and builds up confidence and finally the formal part after that is just you know. You know each other, you trust each other, you are on the same level, it's not the chain of command, however, the chain of

command must be there too. The formal setup of a meeting is important, the meeting will be efficient, but this comes after you have gained the trust I guess, so informal is very important". – A6

As mentioned above, direct informal channels can “pave the way” for a decision or for lobbying or simply engaging the right people. Lots of interactions are informal, which does not have to be a breach of integrity, as explained by A2. Key players might be signaling or whistle-blowing across hierarchical levels and across divisions without having a formal connection. Engaged exploitative key players are found to have a positive effect in establishing direct informal channels. But direct informal channels are also positively affected by the accessible informal organization per se.

“Regulations” is another category that evolves and negatively influences a supported, fast, and focused innovation. Regulators slow down the process of the innovation implementation due to their processes that have to be obeyed. ATCOs, with their immense responsibility, understandably stick to the rules, simply because of their inviolability. Innovation on the other side can also move given processes and rules to be adjusted if it can be proven that a new process, for example, is as safe as or even more reliable than the old one.

When considering the regulator, people are often acquainted with each other, since many employees of the regulator previously worked for skyguide and know the company and its players. The aviation community is small, and people meet each other regularly. Rumors therefore can reach the regulator as well, which then would have a direct negative effect on the regulations in the same sense as negative rumors can do internal harm. This is said to be a reason for trying to control key players that could influence the regulators informally. Nevertheless, regulators have a lot of influence, but since they come from the same “breed”, they would not block an innovation if skyguide stands fully behind it.

“I want to be assured for myself, amongst all of those key players, forget the regulator, because if I am totally convinced, then the regulator will also be totally convinced. Not what we have done in the past in skyguide ... we have come up with fake plans and then the timeframe or budget doubled or tripled as a consequence. So really good planning and just sticking to the plans, are elements which are absolutely necessary for this to deliver”. – A3

Regulators might be slowing the program, but once it is supported internally, including by senior management, regulators would not prevent innovation.

“Positive lobbying” was also identified to be another category of relevance. The elements of supporting autonomous communication, positive lobbying, and gaining momentum represent a self-reinforcing and self-invigorating loop. Positive lobbying has a positive effect on gaining momentum with the innovation.

Engaged exploitative players are said to be a prerequisite for winning the exploitative workforce to advocate for an innovation or a new technology. A2 mentioned that at skyguide, there are some people who are known by the employees as points of reference, i.e. opinion leaders. Those guys have to be found in the organization and then actually convinced, before this spreads through the organization. Gaining access to such people is not that easy, and having informal events can support informal talks according to A9.

“The fact is that nobody will give you this network or collection. It’s something you have to build up, because it has to do with trust and to earn the people’s trust is not done within a day or just a “so how is your family doing?”. It’s something you have to earn ... these opinion leaders are sometimes hidden from executive management, so you have to identify them and you have to identify the influence and power of them and that requires knowing the people in the organization”. – A9

and

“I think our organization really needs to involve opinion leaders...try to identify them. When you look at the controller side, you know we maybe have 500 different controllers and 500 different opinions, and there are some opinion leaders, and when you can win them, you will probably succeed. If you lose them, you have no chance on the user side.” – A5

Positive lobbying starts with an accurate transmission of knowledge and the involving of the right people that have the position, be it formal or informal, to affect others positively.

Several categories have a direct influence on supported, fast, and focused innovation or their implementation. One is **“Gaining momentum”** that is positively affected by positive lobbying, the engaged exploitative players and the accurate transmission of knowledge. Gaining momentum for an innovation is said to be done predominantly by the informal sharing of information between key players. A2 said that you need the formal process, but the informal flow of information is important at skyguide. It is said to be the “afterburner”. What also happened was that well trusted key players, such as those who had already implemented innovations successfully, were convinced by the innovation and became part of the implementation leading team. Such role modeling is said to be able to become a game changer, since other ATCOs state:

” Well if he/she is convinced about that innovation, and he/she never failed at something, this might be something good.” – A3

This model would also support the momentum of an innovation’s implementation, since other people will follow.

4.2.2. Findings from focus groups

4.2.2.1 Findings regarding theoretical proposition 1

Addressed proposition	Method	Participants	Unit of analysis
Proposition 1: “The know-how of exploitative key players, who mainly focus on incremental innovation, is sometimes consulted by explorative key players when it comes to decisions regarding radical innovations“	Focus Group	5 (total) Named by „A21“ till „A25“: Including 1 from the second hierarchical level (i.e. the board of directors, with the first hierarchical level defined as the CEO), 1 from the third hierarchical level, and 3 from the fourth hierarchical level. The above participants were all involved in the innovation program and also took part in the interviews	Team level / Organizational level

Table 13: Case Study I/Theoretical proposition 1 - Overview of the focus group.

Source: Author.

The categories concerning the theoretical proposition are:

Categories	
Enhanced ideas	More ideas have been generated on how an innovation could be implemented/exploited
Improved practicability/feasibility	The transfer from implementation to use of an innovation has been improved
Well grounded decision making	Decisions that are founded and supported by key players
Enhanced mutual respect	Respect towards each other/between two parties, that has been augmented/improved

Table 14: Case Study I/Theoretical proposition 1 - Categories from focus group.

Source: Author.

One key category within the focus group was “**Enhanced ideas**”. A reason for the explorative players to consult the know-how of exploitative players is to lead the implementation of the innovation or the new technology, or as A1 stated, to discuss possibilities and ideas around an innovation. Through such contacts, the exploitative players become acquainted with the innovation. Becoming acquainted with it, exploitative players start to better understand the innovation and develop their own ideas on how such innovations could support future processes or their application in everyday business. Innovations can either be enhanced with the input of exploitative players who are to implement the innovation. They are led to produce new ideas on how such innovation could be exploited more suitably or practically.

” ... by the way, they are all informal (information exchanges), and they are almost all in the sense of brainstorming or sense checking, and the benefits that comes out of those, particularly from the exploratives to the exploitatives, is that you get new ideas coming into the mix and that’s where the innovation comes from. The innovation, so I am telling you this just for the record I suppose, the innovation clearly doesn’t come from the exploitative guys or, very rarely, there might be some innovation in the adaptation of things, where somebody suddenly comes up with a really clever way of adapting something already existing to make something else work, but most innovation comes from the explorative guys. And therefore, those conversations have to happen, as otherwise the innovation will simply not take us forward. Then we need the exploitative guys to work out how to actually deliver it in an HRO type of operation”. – A22

Exploitative players are also found to be capable of visionary thinking and designated to combine stable processes with game changing innovations.

Having valuable input from exploitative players that improve the exploitation of an innovation, the innovation simply becomes more practicable and feasible, which gives rise to the category **“Improved practicability / feasibility”**. This can, but does not have to happen iteratively. Still, any HRO operates in a safety critical environment where, to some extent, the exploitative players have to have the authority to approve any changes to their daily business.

“There are two people I consider absolutely key in the program team, one is the program director, and he is explorative, and the second one is the VC Safety Manager. The function that he is fulfilling there is to challenge things. He brings with him his operational background. So, those things give a sense of ability and the desire to ask: Can this work? If not, why not? What do we need to create in order to make it work? He will start examining what you are proposing to produce and have a look at that and if it doesn't satisfy his needs, for an operation of a safety background, then he will go into that area”. – A22

The early engagement of exploitative players when implementing a radical innovation is important to get useful feedback and finally produce a useful and feasible innovation. In order to improve the practicability of an innovation, the innovation itself has to make sense to them.

“...it might be that the exploitative players should be consulted, especially in the beginning, but also regularly along the way, because this is when we create that iteration that evolves the project into being what we want. And if we take VC for example, it's only through leadership and communication with the people from the likes of you guys (referring to exploitative players) that we ever get buy in. Without their buy in, they won't bring the technology into the operation anyway and, at the end of the day, you guys are responsible for safety. So, if you are not happy with what we have got, then you can't sign it off anyway. So it's a simple buy-in question as much as anything else”. – A22

Improved ideas are not limited to the ability to exploit an innovation in the company, but also to improve the practicability or feasibility of its implementation.

Decisions that are being made with regard to an innovation should be well grounded, based on different parameters, and viewed from different angles. This category “**Well grounded decision making**” is not only directly dependent on determined decision making, but also on iterative communication that is taking place between exploitative and explorative key players and direct informal channels. So, to empower people to make the right decision, the right exploitative players need to be involved.

”... to get the buy in from these people, you have to make sure that they are on board in the project and that it makes sense for them the way they are heading for... it has to do with communication in terms of credibility of these (explorative) guys.” – A25

When considering the opinions of exploitative players, it is not just accepting every scope change to make the exploitative players happy. It is also about bringing them to the table and discussing and preparing the decisions that need to be made, by giving them a say in the case. After such discussions, the decision still needs to be made, and if exploitative players indeed gave their input, this supports the practicable and useful application of the innovation. On the other side, the exploitative players also have to accept at some point that they do not get everything they wished for. There are budget, time, and resource constraints, and if every input was being accepted, the new technology could end up identical to its predecessor, with only minimal superficial changes.

”they can’t always get 100 % (some smiling in the focus group), that’s a very important part. The exploitative players also have to accept that we are not going to fulfill every wish there is, because the explorative players will tell us:” We have got a budget, we have got resources, we have a timeline”, which they are supposed to respect and the exploitative players are delivering the know-how which is probably more than we have room for in the given frame. So I really think what you said is correct, because we are actually in this process that we have started to try to influence things much more, and now something is coming back and the exploitative side also has to accept that there are some limits to respect”. – A21

With well-grounded decisions that are in the majority sustained by several actors and supported by different sides, an innovation becomes supported and more sustainable as well. However,

there are lots of decisions that are not agreed on by everyone, strong leadership interferes as long as the decisions are comprehensible by everyone.

To approach each other with respect, besides being likeable, is said to be a direct precondition for constructive discussions. Getting to know each other and learning what the other side knows can lead to an **“Enhanced mutual respect”** and trust, in the sense that one recognizes that the other side has valuable knowledge as well. Besides this, trust can have the opposite effect too. A22 said that if there is no trust, then there is no reason for interaction that leads to anything constructive whereas A25 added that if one has trust in others and knows exactly that he/she is welcomed with open arms by others, then that person communicates openly, transparently, in a direct manner.

“I am not sure we are at full trust limits yet with the VC, but I think the first big step we took in that area was mutual respect. I think there was a lack of respect, each for the other. Program team had no respect for the ATCOs, you know, they always want gold-plated solutions and have no concept about how to deliver a program and the ATCOs were just like:” You guys are just driven by money and timescales and don’t actually care whether we can use it or not”. The fact is if you genuinely have trust, you save a huge amount of time and energy because you don’t need to go and question everything ... I can see how important and how much of a difference it can make, because if I did, there would be a lot of things that we wouldn’t have to do anymore and it would be a lot easier to bring things in. If the ATCOs trust management, there would be a whole bunch of things that we wouldn’t have to fight about, which is going to be good and useful in the future. We currently have to spend an enormous amount of energy on doing the convincing work, whether I am thinking about VC or whatever. They are all in the same innovation category”. – A22

If the different players understand each other’s roles and responsibilities, greater mutual respect can be derived from the interplay between the exploitative and explorative players, according to A22. Improving mutual respect directly influences the trust in the source and supports guidance for explorative players. Sometimes, as is the case with every connection, this can be established in everyday business; it can even become more profound and open up direct informal channels that can be used later on. Greater mutual respect is also directly affected by the interactions that exploitative players have with explorative players.

4.2.2.2 Findings regarding theoretical proposition 2

Addressed proposition	Method	Participants	Unit of analysis
Proposition 2: “The know-how of explorative key players, who mainly focus on radical innovation, is sometimes consulted by key players involved in exploitative activities when it comes to decisions regarding incremental innovations“	Focus Group	5 (total) Named by „A21“ till „A25“: Including 1 from the second hierarchical level (i.e. the board of directors, with the first hierarchical level defined as the CEO), 1 from the third hierarchical level, and 3 from the fourth hierarchical level. The above participants were all involved in the innovation program and also took part in the interviews	Team level / Organizational level

Table 15: Case Study I/Theoretical proposition 2 - Overview of the focus group.

Source: Author.

The categories relating to the theoretical proposition are:

Categories	
Afraid of change	Players that are affected by the innovation and that are therefore afraid of the consequent changes that it might bring
Determined decision building	Decisions made are sounder due to the integrity of information

Table 16: Case Study I/Theoretical proposition 2 - Categories from focus group.

Source: Author.

Exploitative players sometimes consult explorative players in order to learn something about an innovation or to understand it better in order to verify whether or not it could be used to improve their own operation in an incremental way. It was mentioned a couple of times that the exploitative players do not contact their explorative peers as much as vice versa. The reasons that were mentioned are on one side that exploitative players are usually not the innovative change seeking people. The other reason was that they have a dislike for change within their operations. This can partly be because of the change itself, but also because of safety reasons. However, some exploitative players have an intrinsic motivation to innovate as well, and they might contact and share information with explorative players in the hope to use parts of a radical

innovation to improve their own processes or operations. In such cases, the exploitative players have to make decisions as to whether or not such innovations could be used in their operations. This led to the category of **“Determined decision building”**: Having built the decision in various ways and through various channels, well grounded decision making should be the result. A25 said that he received his information:

“Mostly not with emails; it’s really having coffee, it’s floor talks and whatever, of course meetings as well”. – A25

Opinions are apparently formed in multichannel chats on a formal and informal basis.

Exploitative players that can also have an interest in innovation are not per se against innovation, but they need to be convinced. **“Fear of change”** became another category, which provokes negative behavior in people. When someone is afraid of change, this can hinder his or her perception of what an innovation is capable of delivering. Presumably, not everything is known about an innovation, as exploitative players contact explorative players to get more information about it. Being afraid of change even poses a hurdle for contacting them. Hence, the fear also stops the engagement of exploitative players. However, there is another reason for why interactions can have positive spill-over effects, as they create a chance to accurately transmit and spread specific knowledge about the innovation, how it is working, how it has to be applied, and so on.

“if you have something within our company that makes total sense, you really have a lot of power to develop something good, but if you are not able to communicate that in the right manner and show people that it makes sense in terms of costs/benefits, then you have difficulties ...” – A25

The fear of change can be mitigated through information and through telling people what is in there, as a benefit, for the exploitative players. It helps to communicate what could be facilitated or improved with an innovation and what makes their job easier and safer.

4.2.2.3 Findings regarding theoretical proposition 3

Addressed proposition	Method	Participants	Unit of analysis
Proposition 3: "There are some key players that support or hinder the integration of explorative activities into exploitative activities"	Focus Group	5 (total) Named by „A21“ till „A25“: Including 1 from the second hierarchical level (i.e. the board of directors, with the first hierarchical level defined as the CEO), 1 from the third hierarchical level, and 3 from the fourth hierarchical level. The above participants were all involved in the innovation program and also took part in the interviews	Team level / Organizational level

Table 17: Case Study I/Theoretical proposition 3 - Overview of the focus group.

Source: Author.

The categories concerning the theoretical proposition are:

Categories	
Fanatic explorative key players	Explorative key players who are fanatic about innovations and don't manage to implement them practicable/useable
Trade unions	Trade unions of the workforce
Disclosed rumors	Rumors that are being made public and addressed officially
Disintegrated rumors	Refuted rumors without effect

Table 18: Case Study I/Theoretical proposition 3 - Categories from focus group.

Source: Author.

Key players that do not support the implementation of an innovation are **“Fanatic explorative players”**. Such players are said to be restless, in particular as they come up with promising newer innovations. The scope always changes. Fanatic explorative players fail to bring an innovation into the operative status, and they usually also lack the needed support from the exploitative players when constantly and restlessly changing the technology and therefore the scope. Such behavior results in a negative effect on a supported, fast, and focused innovation. Since the HRO environment is not a fast follower, but rather a last follower business, it is not the place to implement the latest thrills, but something that has been work-proved already. A21 said:

“When you start to put their ideas in place, they already have a new one and tell you that the old one is crap. So they overrule themselves, so to say. Especially in a huge program

like the VC, at one certain time you have to say: "OK that's about it". So you cannot constantly reshape the scope; otherwise, you will never put anything into place". – A21

A22 added:

"... the boss must not be a fanatic explorer; otherwise such a program is a nightmare and if a fanatic explorer is in the most senior role, then you have a problem as a company. He further stressed the fact that when you have a fanatic explorer, strong leadership is clearly wished where the leader says: "I heard you, but we are going to do this anyway". – A22

Fanatic explorers therefore need a strong hand to guide them and ensure that they can stick to one sort of innovation or innovative level, even when they are getting bored with it. Such players, even though they are visionary, convincing and promising lots of benefits, have to adapt to the specificities of an HRO environment, where stable processes are an absolute must, rather than an ongoing retrofitting of the technology being implemented.

Other hindering players are the **"Trade unions"** and their representatives. Trade unions are not against innovation, but their role is to protect the jobholders from being made obsolete. The representatives of the unions are understandably against innovation, when it might be capable of delivering the same results, but with fewer people. But, when an innovation is able to improve safety, through supporting the ATCOs in reducing the workload, it is also welcomed by the trade unions.

"I think if we include other staff members like engineers or people in administration I think there is a line between those key players supporting or hindering an implementation of a new technology that is based on how much they know about it. I think there is a gap, a knowledge gap between the exploitatives and the exploratives. If the reasons for going for a maybe more radical solution are not known or not understood by some of the exploitative population, they will not adopt it, and they will simply oppose mentally". –

A23

As with the engaged exploitative players, this has a lot to do with understanding an innovation properly, which usually positively affects the fear of innovations. Trade unions act like the exploitative players, but once convinced, they support an innovation.

A directly positively affected category by strong leadership is “**Disclosed rumors**”. Disclosed rumors are essentially rumors that are not rumors anymore, but discussed publicly. One option is to disclose rumors by making them public and addressing them publicly in statements or within other communication channels that the company has established.

“... that you try to make rumors public, (confirmed with a “Yes” by A22 in the focus group) as soon as you get these kind of rumors, make them public. I think that is a very strong tool”. – A24

When making rumors public, rumors lose their subtle influence over others through the informal channel, since the rumor has already been addressed through the formal channel and somehow made obsolete.

A direct result thereof is another category, the “**Disintegrated rumors**”. When communicating even negative aspects transparently, there is not much room for rumors, because when problematic issues are communicated, rumors about them have less reasons to exist. Thus, with strong leadership and clear and transparent communication, rumors can be overcome, which is sometimes also supported by having engaged exploitative players who intervene in rumors themselves by telling and spreading knowledge about an innovation. A22 gave background information on how they once managed to refute rumors.

“Let us try and make the use of the informal network meaningless, let us allow everyone to actually talk amongst themselves openly and management won’t interfere and say: “I don’t want to hear what you are saying, so shut up.” They put in an extremely good manager into the center in 2004; he was my predecessor’s predecessor, he was an extremely good communicator, and he spent almost all of his time simply listening to people and trying to say what the situation really was, rather than what the rumor mill was saying. And within about 6 months they turned that around and the leaks disappeared, people felt much more comfortable and capacity went up by about 50 % and that was all about people management. It was about managing the informal organization

and trying to marry the informal communication channels to the formal ones, but then also putting in extremely strong leadership, instead of people that let anything happen amongst them”. – A22

In order to refute rumors, transparency, strong leadership, and alignment of the informal organization would anticipate all rumors and support the fast and focused implementation of an innovation.

4.2.2.4 Findings regarding theoretical proposition 4

Addressed proposition	Method	Participants	Unit of analysis
Proposition 4: “The interactions between different key players involved in explorative activities and exploitative activities have positive spillover effects in regard to the implementation of technological innovation”	Focus Group	5 (total) Named by „A21“ till „A25“: Including 1 from the second hierarchical level (i.e. the board of directors, with the first hierarchical level defined as the CEO), 1 from the third hierarchical level, and 3 from the fourth hierarchical level. The above participants were all involved in the innovation program and also took part in the interviews	Team level / Organizational level

Table 19: Case Study I/Theoretical proposition 4 - Overview of the focus group.

Source: Author.

The categories relating to this theoretical proposition are:

Categories	
Open culture / transparency	Good and bad information is being shared openly
Esteemed exploitative key players	Exploitative players who feel more needed with greater self-esteem

Table 20: Case Study I/Theoretical proposition 4 - Categories from focus group

Source: Author.

A central category is “**Open culture/transparency**”, as a prerequisite for other categories. In a first instance, being able to discuss things transparently with each other, being

sincere, honest, and without hidden agendas support to focus discussions on the issue itself. Furthermore, having an open culture and an open mind towards each other and the outer world directly affects the accurate spreading of knowledge.

“I think there should be an open transparent discussion; there should not be a blame culture, which is the opposite. I think it should be a learning organization. ...I think it must be a mix of experts and also people who can think outside of the box, people that have operational experience more on the client side, people that are even a sort of research people. It must be a mix, a good mix of people that have common objectives, that are eager to learn and have an open exchange of information to get open and transparent”. – A24

Thus, it is about bringing the different key players together, different experts that can also belong to different hierarchical levels. They should share knowledge systematically and reach out to each other to discuss issues openly and transparently.

“Esteemed exploitative players” were found to be a direct result of iterative communication between explorative and engaged exploitative players. Exploitative players often feel left out when implementing an innovation or a new process, as was frequently observed, heard, and read between the lines in this case study. Involving exploitative players, giving them a stake, maybe even making them responsible for the application of an innovation makes them feel important and positive, because they can contribute their expertise. Taking their input seriously, coming back with results that show what the exploitative players suggested, and then communicating iteratively with them in the pursuit of a practicable and useful solution, makes exploitative players feel more esteemed and valuable in the process. They might then become supporters of an innovation.

“Asking exploitative players for advice, taking their input seriously, and showing the results of their expertise shows appreciation for said key players”. A25 mentioned:” ... successful lobbying happens when the people actually see that they get buy in, in terms of what benefit they will get out of it. That they can feel that they are also somehow in the driver seat, that they can contribute to the future innovation or program of the whole company, they can shape – they can – you know. I think that it is something that is really

important. It's not only lobbying but lobbying combined with actual results. Then it works within an expert environment we are working in". – A24

Hence, it is not only resulting in a better and more suitable implementation of the innovation when engaging exploitative players, but also a fast and focused innovation, since exploitative players will become the ones that are also rolling out the innovation. Such exploitative employees can also act as positive supporters and influence informal channels in a positive way, since they feel also responsible for the outcome after they had inputs and helped shape the innovation. The engagement of either explorative or exploitative players can happen in different and uncomplicated ways. It is about involving and engaging key players, including them in the solution of issues and letting them take over accountability, and also making them proud contributors in the decision making processes.

4.2.2.5 Findings regarding theoretical proposition 5

Addressed proposition	Method	Participants	Unit of analysis
Proposition 5: "Key players support the integration of explorative activities into exploitative activities through informal information interactions"	Focus Group	5 (total) Named by „A21“ till „A25“: Including 1 from the second hierarchical level (i.e. the board of directors, with the first hierarchical level defined as the CEO), 1 from the third hierarchical level, and 3 from the fourth hierarchical level. The above participants were all involved in the innovation program and also took part in the interviews	Team level / Organizational level

Table 21: Case Study I/Theoretical proposition 5 - Overview of the focus group.

Source: Author.

The categories that concern the theoretical proposition are:

Categories	
Supporting autonomous communication	Supporting the flow and the opportunities for informal communication
Spread enthusiasm	Carrying and transmitting the positive things that come with an innovation

Table 22: Case Study I/Theoretical proposition 5 - Categories from focus group.

Source: Author.

An important conclusion of the focus group is that key players support the integration of the innovation through mostly informal unaffiliated communication. Therefore, a new category is “**Supporting Autonomous Communication**”. A prerequisite for supporting autonomous communication is that the person engaging in it is convinced about the benefits an innovation can bring. Having autonomous communication can have either a positive or negative influence, depending on the positive or negative attitude regarding an innovation. If autonomous communication is challenging the innovation, it tends to have a negative effect, depending again on the source in question. In this respect, the following discussion was illustrative:

A25: “For me really a good example for myself is when I started with the “skyguide solutions”. If I had not had any access to the informal channels, the thing wouldn’t have survived for one and a half years, because there was quite some opposition on the other side – the informal organization”.

A22: “I agree, yeah”. ...

A21: “I think it’s about trust. Usually, the informal channel is between people who have a certain relationship and so there is a certain amount of trust, and if X is telling Y that the VC is a positive story, it’s going to bring something for the company and for the individual. It is different when top management is telling exactly the same story. So, trust is an important element in informing each other”... “I think there is also some danger because informal communication is much less transparent and therefore also you don’t

have to really explain exactly, you can say what you want and it's much easier to use it in a negative way than in a positive way”.

If an innovation is understood and accepted by the exploitative workforce, this gives strong support for positive autonomous communication. Being able to manage such informal channels or trying to influence them is said to make a difference, which can be achieved through the focused involvement of certain key players that need to be identified in a first step. Electrified exploitative or explorative players can become advocates for an innovation which directly affects the enthusiasm for it.

“Spread enthusiasm” which is usually inherently done by the explorative players was found to be another category. For once, every single person that becomes a supporter of a technological innovation and sees the benefit it brings to the company can become a carrier of the message and influence others. Such persons who take a position in favor of an innovation can become a focal point in supporting the innovation.

“... I mean the key people who really seem to win it for me are the ones who are self-convinced and then become enthusiastic about it. That then makes the really big difference, because then everyone around is like, “Wow, well this has to be good then”. Once people started getting the experience which these guys were saying, they became so enthusiastic about it that other people then also started following it. And they started trying with a positive mindset and that had the effect of turning this virtual circle all over around”. – A 26

Also explorative players who are relentlessly talking about the positive aspects of a new technology spread enthusiasm and have a direct positive influence on supported, fast, and focused innovation. Spread enthusiasm acts like spreading malicious rumors about an innovation, but to the opposite effect. Even fanatic explorative players, restless technology chasers, have this positive aspect, because they are carriers of the message and influence others through their actions and support for the next generation of technology.

4.2.3. Findings from other sources

4.2.3.1 Findings from direct observation

Addressed proposition	Method	Time	Unit of analysis
Propositions 1 to 5,	Direct Observation	Observations were made and recorded throughout the case study	Team level / Organizational level / Individual level

Table 23: Case Study I - Overview of the findings from direct observation.

Source: Author.

The categories covering this theoretical propositions are:

Categories	
Accurate transmission / spreading of knowledge	Knowledge is being shared in its true substance
Direct informal channels	Having informal channels between players without a formal, internal or hierachical connection

Table 24: Case Study I/Theoretical propositions 1to 5 - Categories from direct observation

Source: Author.

According to the category “**Accurate transmission/spreading of knowledge**”, good communication that surpasses hierarchical layers is very important for the right information, getting the right people in order to spread knowledge. A13 added after the interview (off the record) that interactions should take place at every level (direct observation, 21.5.2014), and that the lower in the hierarchy, the lower the confidence that the VC is going to have (becomes reality and implemented). This reinforces the evidence that the farther away from the innovation leading team, the farther away people are from supporting an innovation.

“**Direct informal channels**” are also important, as has been mentioned previously. Building and nurturing them was found to occur in different contexts, such as in breaks, in projects, in informal gatherings. The following observation (Direct observation, 25.6.2014) was made: a senior manager congratulated a working air traffic controller with a clap on his shoulder

as his wife had given birth the week before. The ATCO smiled, but, nevertheless, continued to work while acknowledging the congratulations.

4.2.3.2 Findings from archival data

Addressed proposition	Method	Time	Unit of analysis
Propositions 1 to 5	Archival data	Access to archival data was available on specific dates	Team level / Organizational level / Individual level

Table 25: Case Study I - Overview of the findings from archival data.

Source: Author.

The categories relating to the theoretical propositions are:

Categories	
Elevated trust towards the source	The trust towards a person that is telling something has been improved as a result of a previous situation
Determined decision building	Decisions made are sounder due to the integrity of information

Table 26: Case Study I/Theoretical propositions 1 to 5 - Categories from archival data.

Source: Author.

A vital aspect contributing to the category “**Elevated trust towards the source**” is receiving the correct information from the source it is coming from. The following statement indicates that this is being followed up on and considered as a corporate attitude: „*Skyguide’s personnel are consistently honest, maintain the utmost integrity and act in the best interests of the company in all their business and operating activities*”. - (*Skyguide: Annual Report 2013: Part 2: Sustainability Report, 2014*). Even though this is a company report which does not always reflect what the people really think, it is about trust and integrity in people’s daily behavior towards each other. Trust was found to be a decisive factor when explorative players are implementing an innovation. The building of trust can be supported by engaging exploitative players, including them in decisions building processes, and taking their input seriously, by listening and reacting. This is supported by the following statement:

“Any service company must be able to draw on an innovative, productive and above all motivated workforce if it is to survive in the longer term. In view of this, skyguide seeks and cultivates a direct dialogue with its personnel and provides the optimum parameters for the growth and developments of both its individual employees and the company as a whole. Genuine dialogue and co-determination help maintain a positive working atmosphere, and the required trust and transparency are cornerstones for the skyguide corporate culture.” (Skyguide: Annual Report 2013: Part 1 Overview, 2014).

Similar statements and comments were found throughout the case study. Nevertheless, it was found to be an issue that is being talked about a lot, whereas the actual application of it was considered lacking.

The category **“Determined decision building”** and the interactions it requires were also referred to in an annual report: *“And after intensive discussion with all the stakeholders involved, it was this technological solution (and organizational change that it will entail) that prevailed”.* (Skyguide: Annual Report 2013: Part 1 Overview, 2014). Considering the point of view of different stakeholders, be they employees or leaders, is important for making the right decisions regarding innovation implementation. Therefore, having the right and also the influential stakeholders with a say included in this process is a goal to be pursued with tenacity.

4.2.3.3 Findings from documentation

Addressed proposition	Method	Time	Unit of analysis
Propositions 1 to 5	Documentation	Documentation was collected throughout the time spent on site	Team level / Organizational level / Individual level

Table 27: Case Study I - Overview of the findings from documentation.

Source: Author.

The categories relating to the theoretical propositions are:

Categories	
Supported fast and focused innovation	Leader who actively take the lead with a strong hand
Well grounded decision making	Decisions that are founded and supported by key players
Strong leadership	Leader who actively take the lead with a strong hand
Transparent, receiver adjusted and fast formal communication	Transparent, timely, formal, official communication about events
Side changers	Players who were once explorative and then became exploitative or vice versa
Enhanced mutual respect	Respect towards each other/between two parties, that has been augmented/improved

Table 28: Case Study I/Theoretical propositions 1 to 5 - Categories from documentation.

Source: Author.

There were also other indicators found with regard to the category of “**Supported fast and focused innovation**”. How demanding implementing an innovation in an HRO environment is was stated in the CHIPS program (Swiss Implementation Program for SESAR (Single European Sky ATM Research Programme)), referring to strategic outline, where the specific vision was noted: *“The vision is to be recognized as best practice in the process of implementing innovative technologies and their related procedures in a complex and demanding environment”* (Béron, 2014a). Implementing innovation in an up and running HRO environment requires special attention and creates specific challenges as stated above. This is also shown when referring to the conclusion and outlook from a management summary “Info BoM 14.12.2011” where the following is stated: *“most critical issue: paradigm change for skyguide!”* (Rogl, 2012). It clearly refers to the HRO environment, which makes it even more complicated to change a running business than in many other industries.

With regard to “**Well grounded decision making**”, the following was found in an internal script from change management courses: on a slide referred to “decision making in projects”, only formal decision makers were mentioned. The need to consult exploitative players is also mentioned to some extent:

“Deference to expertise: We delegate to employees with the required expertise. As a HRO, we delegate decision-making authority to employees with the required specialist

expertise. We also promote high levels of self-confidence among our staff by giving them autonomy and decision-making authority and by ensuring coherent decision and feedback” - (Skyhub, 2014).

This written commitment induces the engagement of exploitative players in decision making in HRO, even if they come from the lowest level, as long as they have certain expertise which is essential for a successful undertaking. Well-grounded decision making also results from involving the right people with the required expertise. This is referred to within the “Innovation & Change Implementation” guide of skyguide, where it is stated what needs to be done during a conception phase: *”In this phase the requirements (operational and technical) are elaborated, a solution is developed ...”* (Pauli, 2014). Thus, some interactions should already take place in the conception phase, where the exploitative players need to be engaged, since only they can deliver the operational and technical background at the required level of detail.

According to different sources, **“Strong leadership”** is indispensable for guiding the sometimes fanatical explorers, but also for following a strict path, making decisions, communicating them, and reaching milestones in a project. According to the skybook, *“Increase leadership while actively conducting, participating and promoting the implementation of a new business model”* - (Béron, 2014a). Increasing leadership or strong leadership is therefore known by skyguide, at least within the documentation examined here. How exactly leadership can or will be increased was not elaborated on.

With regard to **“Transparent and fast formal communication”**, Dani Weder, the CEO of skyguide, is said to understand the HRO principles as a corporate philosophy. That philosophy is based on transparency and on an open-door policy (Sulzberger, 2014). This is also supported by the skybook where it says: *“Maintain a transparent communication policy”* (Béron, 2014a). Having communication across several hierarchical levels and horizontally between different departments is also supported by the skybook, which states: *“And finally but vital to the overall undertaking the “Communication stream” which supports communication between streams, organizational units and the hierarchies.”* (Béron, 2014a). However, it was mentioned several times that it needs to be improved substantially.

When talking about **“side changers”**, skyguide does support the interdepartmental exchange of employees that are seeking a new challenge or would like to get to know other

departments and or other work objects: *“we encourage our employees to change jobs and take on new duties within skyguide and support them in all such endeavors.”* (Béron, 2014b). Such opportunities are a way of generating side changers. Still, the article does not specifically offer encouragement for becoming side changers, but it refers to retaining the employees within the company and not losing players that have built up rich and varied knowledge within the business and their areas of expertise.

In the Management Handbook of skyguide, mutual respect towards each other is promoted. This supports the category of **“Enhanced mutual respect”**. It is stated that:

“We work together with our colleagues, customers, partners, providers, regulators, associations and all other stakeholders with reciprocal respect. We value each other’s professionalism and respect each other’s personality and privacy. And we expect them to respect and support our values, too. We declare openly what our objectives are and how we want to achieve them. We learn from each other and share best practices effectively.” (Béron, 2014b).

The statements in the Management Handbook openly declare the objectives that are supporting strong leadership, that a vision is displayed and followed, and that transparency is being preached.


Category	Amount of findings						Total
	Interviews	Focus Group	Direct Observation	Documentation	Archival Data	Artifacts	
Accessible informal organization	1	10		1			12
Accurate transmission / spreading of knowledge	2	6		5	1		14
Afraid of change	17	2	1				20
Aligned informal communication	44	2		1			47
Change resistant exploitative players	20	5	2	2	1		30
Determined decision building	39	1	1	1			42
Direct informal channels	59	1	2	1	1		64
Disclosed rumors	12	2					14
Disintegrated rumors		2					2
Deliberate listening		8					8
Elevated trust towards source	37	5	2	1	2		47
Engaged exploitative key players	59	11		6	1		77
Enhanced ideas	13	1					14
Enhanced mutual respect		10	1	2		1	14
Esteemed exploitative key players	16		1				17
Fanatic explorative key players		11					11
Gain momentum		8					8
Guided explorative key players	14	1	1				16
Improved practicability/feasibility	2	8					10
Improved risk management	15			1		1	17
Improved understanding of Innovation	38	16		1	2		57
Iterative communication		10	1		1		12
Open Culture / Transparency	18	2	4	3	1		28
Positive lobbying	6	6		1			13
Regulations	18			3	1	1	23
Rumors	8	3					11
Side changers	98	8		1			107
Spread enthusiasm		1			2		3
Strong leadership	27	5		4			36
Supported fast / focused innovation	8	8					16
Supporting autonomous communication	16	4	1				21
Trade unions		1					1
Transparent, receiver adjusted and fast formal communication	17	16	1	5	2	1	42
Well grounded decision making	26			1			27
Total	631	174	18	40	15	4	

Table 29: Number of findings in the different categories of case study I.

Source: Author.

4.3. Findings from Case Study II

4.3.1. Findings from interviews

4.3.1.1 Findings regarding theoretical proposition 1

Addressed proposition	Method	Participants	Unit of analysis
Proposition 1: "The know-how of exploitative key players, who mainly focus on incremental innovation, is sometimes consulted by explorative key players when it comes to decisions regarding radical innovations"	Focused interview	11 (total) Named by „B1“ till „B11“: Including 1 from the fourth hierarchical level and representing the Governance board of the project, 1 from the fourth hierarchical level being the project manager, 3 from the fifth hierarchical level, three from the sixth hierarchical level and three from the seventh hierarchical level. The above participants had active functions within the innovation project, ranging from being a sponsor at the top level of the hierarchy to being a subproject manager with functional tasks within the innovation program	Individual level / Team level / Organizational level

Table 30: Case Study II/Theoretical proposition 1 - Overview of the interview.

Source: Author.

The categories relating to this theoretical proposition are:

Categories	
Engaged exploitative key players	Exploitative key players who are engaged and involved by the explorative, implementation-leading personnel, when implementing an innovation
Guided explorative key players	Explorative key players who are guided in the right direction by the input from the exploitative key players who are involved in the innovation implementation
Enhanced ideas	More ideas have been generated on how an innovation could be implemented/exploited
Improved understanding of Innovation	Exploitative players who understand better what an innovation and its functions are about
Improved risk management	Risk management that has been improved as a result of a previous situation
Well grounded decision making	Decisions that are founded and supported by key players

Table 31: Case Study II/Theoretical proposition 1 - Categories from interviews.

Source: Author.

Two central categories that were also identified in the findings from this case study were **“Engaged exploitative players”** and **“Guided explorative players”**. By asking exploitative key players for advice, explorative key players get a chance to let themselves be guided by the input they receive, e.g. information about a technology. Another advantage when explorative players let themselves be guided is that they receive more opinions about an innovation, including potential concerns. Exploitative players who are open to discussing innovations are often also a first sounding board for an innovation. What engaged exploitative players were also capable of was asking the right questions as to whether and under which circumstances and innovation can work or how it could be made to work. Sharing information and talking to one another is conducive to an improved understanding of the innovation itself. B4 said that he/she knows someone who is probably the most knowledgeable kind of person “like a library” in the field (and he/she is exploitative). Whenever an issue arises, this person is available and would usually follow up on it, sometimes even contradicting an OEM (Original Equipment Manufacturer) with substantial arguments or with documents from airplanes built decades ago that something can be done, despite other arguments. Another positive aspect, also stated by B4, is that if he/she is reaching out to exploitative players, he/she receives information about what to point out when talking with OEMs or suppliers, as he/she gets to know the weak points. An innovation usually replaces an existing technology, an existing process, or an existing product, which is usually already in the hands of some exploitative players. B10 expects, for example, from the exploitative players that they are experts in their field and aware of technologies which could be applied. Engaging exploitative players also supports change management aspects, such as transforming affected people into involved people.

“... And that's for me a part of change management. I mean the first and most important rule of change management is to spend time with the people who will have to go through a change. So that they understand why it needs to be changed and that they are taken seriously when they bring in their concerns. So there are always, I think, complaints that "ah, those people are inventing new things. They are just in their ivory tower, and they have no clue about the business". When in reality, those people who are being innovative often have experience from the line and there is exchange“. – B1

Spending time with the exploitative players promotes many supporting activities for innovations. There is the change management aspect and the option to iteratively share and communicate information. When communicating with exploitative players, it is not always about engaging

them directly, but also informing them and preparing them for the innovation coming at a certain time in the future. Through this type of soft engagement, exploitative players are gently being prepared for the future implementation. Explorative players also expect some guidance from exploitative players when important decisions have to be made. This usually happens all informally and under the radar:

“... having a coffee together, standing together, being on the roof, having a cigarette together, whatever time you can share. Because the formal, besides operational risk evaluation, the formal opportunities we're having are meetings. And the time in such a “highway” at Swiss, it does not really allow freedom for explorational thinking by sharing information laterally. So, you really want to make sure, being an explorative person, that you talk to the exploitative people, informally. Perhaps you get the first opinions there. And then perhaps, in such meetings, bring them forward”. – B6

Therefore, engaging and convincing the exploitative workforce was found to be essential in implementing innovation in a HRO.

The engagement of exploitative players can directly affect the implementation of an innovation and result in **“Enhanced ideas”**, as exploitative players might come up with other possible applications for the innovation or can explain in what adapted way the innovation could be improved for its eventual utilization.

“What we started to do three, four years ago is, if you have developed, let's say, a seat, you know already what it's going to look like. You know the technology you're going to use. Then we started to take one (exploitative player) out of the line maintenance team, for example. A seat specialist who has to fix those seats every day, day by day. And we pick one of the better ones of those guys, and we take them with us. And say, “now, we'll have a look there, what do you think?” And he/she comes back with ideas or he/she says this is never going to work. That's what I fix all day. Change that, and it will be fine. Or vice versa he/she supports you and says “yeah, that's great, I never thought about that, but that looks good”. And then he/she comes back into his/her organization and says, in the “Znüinipause” (break), he/she says “I saw that new seat”. Everybody envies him/her, because he/she has seen the new seat already. And then he/she says “oh, that's great”. Or

if he/she says "oh guys, that will be horror, I know it already". And then that thing arrives. Everybody thinks "oh, that will be horror". No good basis.“ – B4

B4 added that such communication is crucial for a successful implementation of something new, and that it could also be killed off by this. It was said that it would be possible to also implement an innovation against the will of the exploitative workforce if it is promising enough, but this is neither recommended nor easily implemented. Having contacted exploitative players also equips the implementation leading person with knowledge about upcoming obstacles that need to be taken or circumnavigated. Involving the exploitative workforce and requesting their genuine expertise is also flattering for them and makes them feel important and decisive within the decision making process. It is not just about gathering better ideas for an innovation, but also about gaining their buy-in and trying to influence their opinions and their own informal influence at a later stage. Such interactions can have several positive spill-over effects.

„For me, it's that I see suddenly what others are doing, and this gives me a new facet about what I could do with my project and link it to their project. Also a kind of a role model. Sometimes I see Ground (Operations) or Product (Development) guys working within the ground department, our department sorry. They do beautiful lounge stuff with beautiful designs, and, I think, in five minutes I am at their desk, and ask them how did they do it and can we bring it to the aircraft in order to have one common design? Stuff like this inspires me a lot, seeing what they are doing and that this lamp could also be in the aircraft, maybe in a smaller scale but maybe we could copy their lamp into our first class, this is what came into my mind (smiling)”. – B11

Having contacts or interfaces and occasions to share knowledge and inform the rest of the company about ongoing projects can spread the idea and its exploitation throughout the company, bringing other benefits.

Another category is “**Improved understanding of innovation**”. Exploitative players that are contacted and confronted with a technological innovation by explorative players have to deal with that innovation, compare it to the current technology, and form their own evaluation of it. In other words, they have to understand the innovation itself and get the information they need or indeed lack. Such information gathering usually happens in a first instance informally, where trust plays an important role.

“... With the informal, you get a certain background and trust. So I think, this is really important. But the formal one, then there you fix everything in the group. So I think on two dimensions. The first is building trust with the informal, you see what's really behind. And the formal is more, let's say, the exchange in a bigger group about all the ideas“. – B2

The gathering of information and the building up of one's own knowledge is said to be more informal.

Asking exploitative players for their expertise or their advice about a new technology leads to decisions by explorative players with **“Improved Risk Management”**. Exploitative players have extensive knowledge about the safe operation, because they deliver it every single day. Therefore, they are correctly considered influential when it comes to the risks that come with a new technology. B10 said that the expertise that he/she is getting from exploitative players is the following:

“... that you bring everything on the table and that you really analyze the whole system, the risk analysis, and that you come to a conclusion with a few technical, a few from operations and a few from IT (Information Technology) and maintenance”. – B10

Engaging exploitative players leads directly to improved risk management. Explorative players will be informed by the exploitative players about risks with new technologies, because, as users of the old technology, their knowhow can be used for identifying possible weaknesses of the new technology. They are also broadening the horizons about technologies.

“Like in all of the aviation industry, if something new comes along, you basically have to be suspicious about it. We have two processes at Swiss, one is called ORE and the ORA (Operational Risk Evaluation and Operational Risk Assessment). Risk Assessment is the large version, Risk Evaluation is the small version. So if somebody comes up with modification ideas or thinks about implementing equipment or not implementing equipment, we usually do that via risk evaluation. Not just cost-benefit analysis, but what's the risk if we don't implement this equipment, what is the risk if we do implement it, because it is not always bringing benefits, it can also be more complexity, failure risk

in the equipment that you are now relying on. You have fallback procedures for automation that you try to put into the cockpit, you have to have education, that can be misunderstood in this program. So, every innovation is a risk, there is no discussion. So we have to weight and balance of the correct use of that equipment, versus the downsides, the misuse, the unavailability, and fallback procedures”. – B5

Therefore, there are formal procedures in place for evaluating risks in innovations. Nevertheless, exploitative players contribute to such operational risk evaluation or risk assessment with their expertise through their direct engagement.

What follows from improved risk management is “**well grounded decision making**”, in that several players had formal or informal input with their corresponding expertise. It helps acceptance if a decision has not just been imposed from the top, but fundamentally built through engagement of several experts, such as the users of the old technology or the explorative players who have more profound knowledge about the innovation or new technology that is evaluated.

“... in the end, there will be just a landscape of opinions then, and somebody has to bring it to a decision, and this is our role. We then make a recommendation and bring it to the management board. Then the management board sees the figures, sees the opinions of all the sides, and then they decide. This is our way, and then innovation can be killed due to costs or risks”. - B11

Respecting each other and each others' role is important, like attending meetings that might not seem interesting to the individual, but the contents and maybe an expert's input are important, in the sense that, even though such a person might not be able to contribute to every issue, he/she might be needed for certain agenda items, and his/her expertise is relevant for a well founded decision.

4.3.1.2 Findings regarding theoretical proposition 2

Addressed proposition	Method	Participants	Unit of analysis
Proposition 2: “The know-how of explorative key players, who mainly focus on radical innovation, is sometimes consulted by key players involved in exploitative activities when it comes to decisions regarding incremental innovations“	Focused interview	11 (total) Named by „B1“ till „B11“: Including 1 from the fourth hierarchical level and representing the Governance board of the project, 1 from the fourth hierarchical level being the project manager, 3 from the fifth hierarchical level, three from the sixth hierarchical level and three from the seventh hierarchical level. The above participants had active functions within the innovation project, ranging from being a sponsor at the top level of the hierarchy to being a subproject manager with functional tasks within the innovation program	Individual level / Team level / Organizational level

Table 32: Case Study II/Theoretical proposition 2 - Overview of the interviews.

Source: Author.

The categories concerning this theoretical proposition are:

Categories	
Engaged exploitative key players	Exploitative key players who are engaged and involved by the explorative, implementation-leading personnel, when implementing an innovation
Guided explorative key players	Explorative key players who are guided in the right direction by the input from the exploitative key players who are involved in the innovation implementation
Improved understanding of Innovation	Exploitative players who understand better what an innovation and its functions are about
Determined decision building	Decisions made are sounder due to the integrity of information
Afraid of change	Players that are affected by the innovation and that are therefore afraid of the consequent changes that it might bring

Table 33: Case Study II/Theoretical proposition 2 - Categories from interviews.

Source: Author.

Exploitative players who are working in their everyday routine sometimes contact explorative players when they would like to make up their mind about a certain innovation. Here, the interaction between “**Engaged exploitative players**” and “**Guided Explorative key players**” is fundamentally important. At Swiss, the program of the innovation implementation was led by key players who were placed in a contextually ambidextrous context. It means that

explorative people did not belong to a separate team detached from the exploitative team leading the innovation implementation process.

According to B6, it happens that explorative players are contacted by exploitative players, but it happens less than the other way around.

“... honestly ... exploitative people, what I found out, have problems with really accepting input from explorative people, because they say: “it always worked like this. Yes, we can improve it”. But whatever you bring there, products, fantasy, that's too radical, it can't work ...They are also two sort of two different personalities, my experiences with these two characters“. – B6

It was also mentioned that asking explorative players leads to an improved understanding of innovation as a direct consequence. By asking explorative players, one becomes more knowledgeable about a certain innovation and better connected with that world. Still, exploitative players mainly contact their explorative peers when they are in need of knowledge about a certain technology.

“I was looking for external expertise, especially modern expertise on the tool. Also with some statistical data. Proving what we went for. And that became Lufthansa city line. ... He/she is a sort of the “specific technology guru” within Lufthansa. And he/she provided me with slides, findings, whatever they had in Lufthansa city line to prove our business case. He's/she's a professional. He's/she's the guru. He's/she's the pope of this specific technology in the group. And together with him/her, I was able to convince the Lufthansa group that it is necessary. And by having the data available from Lufthansa city line, we were able to convince the management board to approve the installation of the specific technology “. – B6

Another example at Swiss was Kaizen, as explorative players are being contacted by their exploitative peers for support or to broaden the horizons in terms of possible solutions to a specific issue.

Having the aforementioned interactions leads to an **“improved understanding of innovation”** for the exploitative players. Decision makers said that they like to ask both sides in

order to really get a black-and-white picture and see the contrast that exist. Such knowledge is usually gathered from internal, but as well from external experts to broaden the pool of expertise even more. A prerequisite is the interest that leads an exploitative player to contact the explorative players who can deliver such expertise.

“...I was willing to learn this part (knowledge), I built it up by being interested in reading and learning and contacting those people to get the information ... So I try to get loaded with all the pros and cons”. – B11

This interest depends on the individual itself as well as on the sense of engagement that the person brings into the company. On the other hand, having an improved understanding of the innovation normally erodes resistance against it.

B4 also said that exploitative players check their ideas with explorative knowhow carriers, e.g. asking whether something that they saw would make sense or whether there are parts of it that could improve their processes. It was further mentioned that exploitative players have quite good knowledge about their area and that they would like to verify their expectations towards an innovation:

"Hey, I have seen this and this, that is much lighter, we would save weight, that's much stronger, we would save on maintenance". – B4

Thus, they would like to obtain the knowledge of explorative players, because their expertise can help them see innovative options and how they could fit in with or replace existing technologies. Such interactions support the understanding of an innovation and the successful decision building process.

“Determined decision building” was also found empirically to play a major role. Management board members wanting to make up their mind about a decision preferred to have the whole picture about an innovation.

Players higher up in the hierarchy have to make up their mind and for the most profound possible opinion about an innovation that might be worth and investment. It was observed that before such important decisions, exploitative players are contacted to contribute their expertise to the

senior executives in an informal way. Sometimes, simple phone calls were made; sometimes, there were meetings which were basically preparing for the decisions the senior managers had to take in later meetings. He/she wanted to equip himself/herself with the relevant knowledge in order to be able to argue his/her points in the official meeting. On the other side, exploitative players on lower levels of the hierarchy also sometimes think about applying an innovation and reach out to explorative players. This also happens informally in most cases.

“I think it's informal communication that's really important... I think that's the basis, because here you build trust. People are more open to discuss things when it's informal. You know, you see a little bit behind the scene. Not always the truth; there are also some rumors or some wrong interpretations. But I think that's, let's say, the basis where people make up their mind”. – B2

Decisions are said to be built informally through informal information sharing. One can get honest and direct feedback through informal channels, or otherwise trust can be built up in informal channels, as people get to know each other as the start of their relations. Later in the process, when an exploitative player has made up his/her mind about an innovation, the decision whether to follow or not pursue it is made more formally in a meeting.

Many exploitative players are reluctant to accept the change that an innovation implies or even feel threatened by it. This suggests the category **“Afraid of change”** arise. When a new technology is planned to be implemented, changes regarding some functions in the company can occur and such changes can be a threat or perceived as a threat. This might be due to forcing people to leave their comfort zone. Changing habits and changing behaviors is known to be challenging.

“You have to convince people who are afraid of new things, you have to bring expertise on board to show them it's possible, you have to benchmark and show that others also did it, and you have to convince management. It's not magic, but you have to do it”. – B11

It is not only spending time with the people affected by change, but also about finding a way to reach all stakeholders in the process. This is said to be especially difficult, since at airlines the aircrews, and therefore most of the people, are in the air in another time zone than the

headquarters in Zurich. Fear of change has a negative effect on the engagement levels of exploitative players, since they may try to avoid the confrontation with the innovation for as long as possible, even if they know that the change will come at some point.

4.3.1.3 Findings regarding theoretical proposition 3

Addressed proposition	Method	Participants	Unit of analysis
Proposition 3: "There are some key players that support or hinder the integration of explorative activities into exploitative activities"	Focused interview	11 (total) Named by „B1“ till „B11“: Including 1 from the fourth hierarchical level and representing the Governance board of the project, 1 from the fourth hierarchical level being the project manager, 3 from the fifth hierarchical level, three from the sixth hierarchical level and three from the seventh hierarchical level. The above participants had active functions within the innovation project, ranging from being a sponsor at the top level of the hierarchy to being a subproject manager with functional tasks within the innovation program	Individual level / Team level / Organizational level

Table 34: Case Study II/Theoretical proposition 3 - Overview of the interview.

Source: Author.

The categories concerning this theoretical proposition are:

Categories	
Direct informal channels	Having informal channels between players without a formal, internal or hierachical connection
Strong leadership	Leader that actively take the lead with a strong hand
Mastering costs	Not diverting from the project budget or changing the approved scope
Transparent, receiver adjusted and fast formal communication	Transparent, timely, formal, official communication about events
Aligned informal communication	Degree to which formal communication matches informal communication that is taking place
Change resistant exploitative players	Exploitative players who are resistant to change and do not endorse new ways of doing something
Trade unions	Trade unions of the workforce

Table 35: Case Study II/Theoretical proposition 3 - Categories from interviews.

Source: Author.

As observed, the informal opinion building and making has its power. This power derives from “**Direct informal channels**” through which some is influencing or being influenced. The impact of informal opinion building was used to a certain extent by experienced program and project managers in a tactical way.

“... you have to find different means and how to introduce change. The first step would be "ok, we have this idea, we want to change something, and we need involvement from this department, from that department and from this." Then we have to develop a strategy, how are we going to best convince them to participate in this change? And in one department it might be "oh, let's contact this person because he/she has a good influence that this is going to happen". And "oh in that department that person might be important but he's/she's against it, we already know, so let's see how we can do that it still works“.

– B1

It is not only key players who use informal channels for whatever reasons to communicate, but seemingly every single employee uses them unconsciously during breaks or on the way to work. Informal communication is said to connect people, as there is no pressure to always be correct in statements, technically and politically, and hierarchy is often also unimportant. Intentionally used direct informal channels are said to be either supportive or hindering for innovations. They are supportive when they emphasize how good an innovation is going to be, which directly and positively affects the thinking of the other players, or the opposite, if an innovation is attacked instead. Someone can also be a key player, because he or she is able to contact decision makers or opinion leaders directly and informally. Moreover, it is likely that decision makers are would contact knowledge suppliers informally before making up their mind with regard to an innovation or that they are in turn contacted beforehand by the knowledge suppliers.

„One example: If I have a hot topic for the top management, before it comes to the discussion at the management board, we do a lobbying round. Quite officially. So we call the big guys... COO (Chief Operations Officer), CCO (Chief Commercial Officer) and CFO (Chief Financial Officer). Yeah, normally we don't speak to the CEO before. ... The CEO gets it at the meeting. So if we see that this could be a hot discussion and you need to have more time to discuss it, as just in the management board, we do lobbying tours. I mean, we reserve an hour with those big shots and we explain them the whole case and especially the behind-the-scene-things. And they have the chance to ask questions on

their own. You know... that's a formal thing. I mean you have to ask for a meeting. And you have to go there, sit at a table and discuss that. And based on the business case you have written, at least in a draft version. And then what happens there... they are relaxed. They have no problem to ask even, in their minds, stupid questions which they possibly would not in front of the CEO. If they don't understand an abbreviation for example, they will ask you "What is BFE (Buyer Furnished Equipment)?" They don't do that in a top management meeting, because they think the others all know. Most probably nobody knows. Yeah. So things like that... You know that's between the lines. And then you can, based on their reaction, you can start to possibly answer a question already before they have asked it, so the business case has much more of a chance to go through". – B4

As above, direct informal channels can move upstream as well, i.e. towards senior management, where it is used in order to pave the way for an innovation. The difference is that the innovation is pushed from the lower ranks to the top ranks, so it works the opposite way. Again, knowledge flows from experts to decision makers. Such informal channels were found to be used regularly to bring innovation into the company, although it is described as unfair, even by its users, because you can only participate when knowing the right people and when you become part of such informal networks that can connect the dots across the hierarchy and the horizontal layers of the company. Key players who have such connections said that they sometimes knowingly circumnavigate their direct supervisors informally, as they would not support an innovation, while they know that support is more likely one or two hierarchical layers further up. They are said to use a rather informal way of not formally breaking the communication hierarchy, but pushing forward information with the aim that interest and demand for it then comes back through the official hierarchical layers.

What is said to be needed in an innovation project was “**Strong leadership**”. The ones that are the designated program or project managers have to have distinct skills for leadership. It is said to be about involving and caring about the right people, while also coming up with decisions which then need to be forced through, sometimes against resistance. Being a strong leader is also about listening to different stakeholders and choosing the most appropriate option when making decisions. Strong leaders also fight rumors and lead as transparent role models.

“What I discover for leadership, and this is very important, is that if you nominate somebody in such a program or project, you may have people with experience that can

handle a current problem perfectly. In terms of leadership, we have to carefully position people where they can really apply their real potential. So this guy for example is brilliant in putting together a specific work program that works well. This person also will have a picture about what to do in terms of the future, what is going to pass. Also to choose the right moment in time to organize that, to see the project on the time axis, and to organize it to make it happen. I need to nominate somebody who does not have the key know-how in essence, however, who has the ability to transport the right message". – B3

Thus, strong leadership already starts at choosing the right leader to implement an innovation. Change management is said to be leader-intensive. Sometimes strong leadership has to be applied when making unpopular, but correct decisions.

"I see my role sort of just as interconnecting these different projects. Align them. This is true in about 80% of cases as long as we have reached a common understanding in the group. We go for that. We propose it. And my remaining 20%, that is the point where I say, OK, I heard you. You all agree. But I do not agree with the whole group. Here I really want to have a different way to go". – B6

Strong leadership finally guides the explorative players and helps with keeping the budget, time, and results in a project within limits.

An important issue in Swiss was the costs that had an effect on innovation, suggesting the category "**Mastering costs**". The innovation driving key players were driven by costs awareness. Mastering costs and performance was paramount. A result was that people sometimes seemed to be stressed or in a hurry.

"We are understaffed generally in this company. But this is what makes us successful because, we have low baseline costs, and this means that this person here, he/she is working on the 777 (Boeing 777) project and on the C-Series which makes the communication implicit through the same person. So, there is a lot of discussion also between the programs, because the program leader and myself, we also share a lot. When I have an "I see" moment, I always tell him: "Hey you know what we found" ... There is a lot of discussion, a lot of informal exchanges, and a lot of connections between the same key players". – B5

At Swiss, it was also said that only the genuinely required innovations were financed and supported and that nothing fancy without benefits has ever been implemented. Leadership was also considered critical. As costs are a critical issue, the program leader basically had to defend each little piece of innovation and convince the sponsors of the benefits in terms of a safer, more reliable, or cheaper operations afterwards.

There seem to be key players, usually in a management position, who are able to formally communicate in a fast and transparent manner. This represents a new category, i.e. **“Transparent, receiver adjusted and fast formal communication”**. Swiss has considerable diversity, ranging from cockpit crew through the technology department to other office functions, like network planning. Such diverse departments with their different cultures need to be addressed individually in order to reach them with specific messages, including innovations.

“Swiss is a very large and diverse company. Let's say, as an extreme, the way people talk to each other in Technology (department) is very different to how people talk to each other in Cabin Crew. And when in Technology you're going to greet someone... let's say... “eeeey you buffoon! How was last night?” If you do that in Cabin Crew, the other will say “what do have against me, why do you call me a buffoon?” And it's just a different way of dealing with each other. And it's not just the way they talk, it's also the way that things are done”. – B1

Accordingly, the communication should be prepared in such a way that it reaches its audience in the appropriate way. Appropriate communication can therefore be supporting the implementation of innovation, which is essential the key players' task. Having a clear vision and leading accordingly, it is important to be predictable by all stakeholders and all relevant cultures involved in the undertaking. Strong leadership directly affects transparent, audience-appropriate, and fast formal communication. It is also important how things are being said. If information is communicated in an unfavorable way, innovation can be harmed directly. Communication should be clear and transparent and leave no unanswered questions. There is communication or information that finds its way through the proverbial grapevine (informal). Official and formal communication should come before informal information in order to suppress rumors. Still, it is said that an interplay of formal communication, paired with informal communication or lobbying rounds, works best to support an innovation.

The communication that one is receiving should be aligned with the informal communication which pertains to another category, i.e. **“Aligned informal communication”**. In other terms, if you hear one thing from a formal channel, but your colleagues tell you otherwise, then there is a discrepancy between the formal and the informal communication.

“(Suppose) you receive a letter from your CEO and he says “ah, guys, it's all great”. But you sit in the last hole of this building. Possibly in the basement somewhere, and it's dark. And your desk is falling apart. You don't believe him. And you will be the guy at the “Znünipause” (break) who says “hey, that's all rubbish, we are slaves here”. But the other guy in the CEO office has a completely different view. So that's always the critical part, I think. And that's then, when the informal opinion-making is done“. – B4

If informal communication is not aligned, rumors will flourish and influence players in an unfavorable manner. One challenge is to get access to the informal organization, in particular, opinion-building statements that are coming from opinion leaders. In case of divergent information, the designated person should align informal communication with the formal one. B22 explained that this could be achieved by being present, being tangible, and following up on all formal information with informal information, simply by staying with its audience in order to back the formal information up and have the opportunity to confirm it informally by word of the mouth. Aligned informal communication has a direct effect on an improved understanding of an innovation.

There are also hindering players, such as **“Change resistant exploitative players”**. Such players sometimes affect the implementation simply by not supporting it or just by ignoring it in the most suppressive way.

“... we have some key players. I don't want to name them, but you know they are people, they see always problems, if you want to change something. So I mean, they only see the problems you would have with that and don't see the benefit or so“. – B7

Hindering key players also include people who seem to know everything better and often claim that they would be capable of delivering a better solution than the OEM and therefore inherently critical of innovative solutions. There are other hindering key players according to B10, who are

stuck with the old technology and not able to make the step forward. Others can have a negative influence on the outcome of the integration of an innovation, simply by communicating or spreading critical opinions about it.

”Sometimes it can happen with the conservative ones that they tell other conservative people: ”Ohh, have you heard what he/she wants? A specific technology in the cabin, he/she is crazy”, and they start “Oh my god”, and then you have a whole crowd against you. This can also be the effect of communication. But anyway, my experience is, let them talk and somebody else will find it cool and then say: ”Have you heard? We will have a specific technology in the cabin, coming to the passenger”. – B11

Resistance to change is said to be always present. Such resistance can be mitigated by transparent and audience-appropriate communication and information. Generally, it is said that negative communication does not support an implementation, whereas positive talk does support the integration of explorative activities into exploitative ones. Nevertheless, B11 also added that there are effective tools, such as Kaizen, with which to introduce innovation into the hindering exploitative players’ world, which is sometimes the only way to convince them. This Kaizen process is defined as bringing all the relevant players together, including exploitative players, engage them, let them study a situation, and get them to come up with their own ideas about how something could be improved. To conclude, change-resistant exploitative players are said to not support a fast or focused innovation, but when engaged, they become supportive.

Another type of hindering key players is represented by the **“Trade unions”**. They try to protect the jobs of their members, and the normal process of innovation results in needing less resources. Therefore, trade unions are usually said to be against new practices:

“Communication is extremely important. And we can learn a lot there. We are still not at a good level. ... I think informal communication belongs more to our culture. There is so much in a coffee or at the lunch or so.... It is so much easier to talk and to get the feeling between the lines. What could be an issue for the counterpart? Or where do you see no issue? Which way could it go? And they may have good ideas as well. Whereas in an official meeting, they need to play their official role. And if you think about the cabin union for example... they have to be quite strict. But those guys, I just think of one, that person for example I'm thinking of, he/she was a chief before. So he/she has a lot of

knowledge on a specific work. And that person, he/she had the best ideas on how to do it, for example”. – B4

Therefore, trade unions are said to be hindering the innovation process, simple because innovations put jobs at risk in the long term. They have a direct negative effect on supported, fast, and focused innovation, because dealing with the trade unions can consume a lot of time.

4.3.1.4 Findings regarding theoretical proposition 4

Addressed proposition	Method	Participants	Unit of analysis
Proposition 4: “The interactions between different key players involved in explorative activities and exploitative activities have positive spillover effects with regard to the implementation of technological innovations”	Focused interview	11 (total) Named by „B1“ till „B11“: Including 1 from the fourth hierarchical level and representing the governance board of the project, 1 from the fourth hierarchical level being the project manager, 3 from the fifth hierarchical level, three from the sixth hierarchical level, and three from the seventh hierarchical level. The above participants had active functions within the innovation project, ranging from being a sponsor at the top level of the hierarchy to being a subproject manager with functional tasks within the innovation program	Individual level / Team level / Organizational level

Table 36: Case Study II/Theoretical proposition 4 - Overview of the interview.

Source: Author.

The categories for this theoretical proposition are:

Categories	
Iterative communication	The sharing of information that results in feedback
Deliberate listening	Listening thoroughly to what is being said and trying to understand it
Improved practicability/feasibility	The transfer from implementation to the use of an innovation has been improved
Open culture / transparency	Good and bad information is being shared openly
Elevated trust towards source	The trust towards a person that is telling something has been improved as a result of a previous situation
Accurate transmission / spreading of knowledge	Knowledge is being shared in its true substance

Table 37: Case Study II/Theoretical proposition 4 - Categories from interviews.

Source: Author.

Touching base iteratively was found to be important in the project. The category **“Iterative communication”** represents this, directly affected by the engagement of the exploitative workforce. Iterative communication can take place formally or informally. It is important that iterative communication and the sharing of ideas and opinions about practicability happen. Having such communication and coming back with results or feedback strengthens trust in one another, because people get to know each other better and see the idea growing and getting better in terms of practicability.

“I think a huge mindset change happened in the last few years. The example I'd like to bring is the new A320 galley and cabin configuration, where manufactures approached Swiss and said: We have an idea of how to build the galley in the rear of the aircraft, further to the back. And that way you might be able to add new seat roles. And what Swiss then did is, they said, “yeah that sounds like an interesting idea, we would like to build a mock-up and test it”. And we did a Kaizen workshop for that. We then called together a team with flight attendants, and we started working in this mock-up galley that made out of wood, but with one to one dimensions. And then we brought a list of over 20 points that we found could or should be improved. And then the manufactures went and they brought new ideas about how to improve this. And then we didn't order the galley. We said, “ok, bring us a new mock-up and we'll try it again”. So, going to these, at least two iteration cycles has brought about a product that is a lot better suited to real life.

And by having much higher level of everyday usability. I think that wins them the trust of the people also on the other side. And I think it's true to say, maybe eight years ago, before we had Kaizen, we might have just brought the first version and started having all these troubles in implementation. And now, it will come and I think we will have a lot fewer problems. Probably, there will still be some issues. You can't think of everything before“ . – B1

Having a formal process, e.g. Kaizen, directly supports iterative communication, but it does not need to imply a formal gathering of people; it can also be done informally. It also promotes the feeling of making something better than the status quo, bringing together opinions and expertise, and listening to each others' view of the possibilities and restrictions that every single person can bring with his or her expertise.

When talking to each other, each side should listen and listen carefully to what the other side is saying. This was observed to be another important category, i.e. **“Deliberate listening”**, which has a direct positive effect on iterative communication. When the implementation of an innovation takes place in an innovation-averse environment, such as an HRO, one should intentionally seek the advice of exploitative players. With a view to maintaining safe operations, it is important to listen to exploitative players who are still using the legacy technology.

“First, I think the exploitative people are listened to. That they can give feedback, their opinion ... The exploitative people to us are also important, because they're sort of, in German, the "Gralshüter" (the ones protecting the treasure) in the company. An exploitative person can be one involved in flight operations. He should not be innovative at all. He's sort of a "Gralshüter" saying “we always do it this way”. ... So, the trust builds up, and it allows the exploitative people to understand, to start understanding the explorative people. Perhaps, the explorative person then says at the very end, “Well, ok, 100% exploration on that topic was a bit too much”. Let's go for a 60-70% innovative, explorative way and the remaining 30% stays as it is“ . – B6

Listening is also said to be important, next to really understanding people's needs, to show the other people courtesy and respect.

A direct result of some iterative interactions and enhanced ideas is **“Improved practicability/feasibility”**. Some participants would use exploitative players as a sort of sounding board for testing an idea or innovation. These persons contact known key players, usually from the exploitative side, whom they trust. They present or confront them with the blueprint of an idea or a first prototype of an innovation and expect feedback as to whether the innovation could stand a chance or what should be changed to make it a valuable innovation that would be supported later by the mass of exploitative players.

“First of all I talk to the crew ... I have some key persons, one is very conservative, and I know what to expect when I ask him/her, but it’s important, because he/she reflects a huge mass of conservative flight attendants. And there is one from the union and several others, but lets take them. ... They have other functions, outside of being flight attendant, so they have more knowledge, and they know me and I have known them for a long time, so for me it’s like a first check for everything. If they say “forget it”, then I really have to. When they say: “OK, you have to change it a bit, I could imagine it’s a good idea”, then I go on. They are really important”. – B11

The relations between exploitative and explorative players can be established through formal projects, but they mostly have been existing for years as both types of players have been working together in a previous jobs. Both might have been exploitative players, and one later changed sides. Exploitative players are said to be the “keepers of the grail” for stable, uncomplicated, and reliable processes, in the sense that they inherently protect the status quo. In the case of some innovations, this can end up in a win-win situation, as processes can be simplified or made more reliable in an easy and understandable manner. If such win-win situation can be demonstrated, e.g. promising less work for crews or another “goody” for someone, the innovation becomes much more widely supported and feasible.

One very important aspect of interactions is an **“Open culture / transparency”**, especially from the leadership side. Leaders should communicate transparently and honestly, and they are expected to make decisions, including potentially tough decisions. B4 suggested that this has a lot to do with the culture of trust between people. He/she further stressed that if you hear something from a source you do not trust, you tend not to believe the information.

“It’s also if you step into another garden, how people can be upset about this, if they step into another garden and think about issues they are responsible for. I think it’s quite important because, also, if the pilot side are coming and thinking about maintenance, for me it’s an open discussion and I really appreciate this, but most of the managers at the middle or upper level, they don’t like this. So they are very restrictive in building fences around their project, around their responsibilities, and they don’t let anybody in to share experience, and this is a big issue, also within Technology. Engineering, Maintenance, they have their fences, they have their protection and you are not allowed to step into their garden”. – B10

Being transparent towards each other, not having hidden agendas and espousing an open culture directly benefits the accurate transmission and spreading of knowledge. Protecting one’s own knowledge or “garden”, as stated above, might be correlated with being afraid of change.

Trust has been mentioned several times, specifically trust in the source of something said or written, formally or informally. This resulted in another category, i.e. **“Elevated trust towards source”**. One spill-over effect from interactions is said to be the formation of trust between the people having the interactions. Trust was also considered “the basis for everything”. It should be established through the transparent sharing and receiving of information and feedback. Decisions should be explained and shared with the rationale behind them. The building up of trust needs much time, and it is easily lost. Nevertheless, the building up of trust begins with personal interactions.

“Of course, it’s an opportunity and a risk. The opportunity is you build up more trust (through interactions), it gets easier the next time; you probably then need fewer informal meetings, because he knows exactly what I mean, because he knows my history, my road map, you have to tell him what is driving you and this is better on first low level and then he knows exactly how I will react in a way, and I know how he will react, and I can beforehand already find the arguments or consider probably already his. I know what I have to do, what I have to offer to him so to say in order to bring him behind me, to bring that innovation alive”. – B9

Gaining trust in someone and in what that person is saying is fundamentally important in order to assure that such information and knowledge accepted in the first place and more likely to be

understood. In a second instance, it is spread more accurately and not kept undisclosed, because of the trust in the original source of the information/knowledge.

Another category relates to this: **“Accurate transmission/spreading of knowledge”**. Knowledge should be shared and received by persons who can benefit from it. This can be done through informal discussions or through formal meetings with set agenda items and meeting minutes collecting the specific decisions made and the knowledge gained.

“Every discussion that has or increases knowledge or broadens the horizon is positive. What I do know, at the formal layer, we have a lot of exchanges, because almost everybody gets every protocol, I think that it is important. It used to be different at Swissair, it used to be:” You don’t need to know this, because you are not part of the project”. The more information that we share, the more somebody can read and say:” Oh, this might be of interest to me”. So, there are a lot of discussions, a lot of information sharing going on”. – B5

An accurate transmission or spreading of knowledge is said to be facilitated by face-to-face interactions. Knowledge can also be spread by the phone or email. In the first instance, however, it is transmitted easiest by going on site and meeting people in person. B1 said that, by sharing accurate information, people learn from each other. For instance, they found that they need to have covers that can be replaced quickly. This idea came from this specific technology program and spilled over into other aircraft types. Not spreading accurately knowledge can have an averse effect.

“... there are side effects that we are burning resources for nothing and, for sure, if we can bring every knowledge to an innovation pot and share this innovation, then we have the best solution, but if somebody is not willing to share knowledge, because it’s a protection, knowledge can be that, I know it, and nobody else knows it, so it’s a powerful system to bring you in a position and saying, “I am the only one who knows it,” and knowledge is power, and this is an issue”. – B10

Again, a negative factor was seen in the fear of change, in particular in the form of the fear of losing power.

4.3.1.5 Findings regarding theoretical proposition 5

Addressed proposition	Method	Participants	Unit of analysis
Proposition 5: “Key players support the integration of explorative activities into exploitative activities through informal information interactions”	Focused interview	11 (total) Named by „B1“ till „B11“: Including 1 from the fourth hierarchical level and representing the governance board of the project, 1 from the fourth hierarchical level acting as project manager, 3 from the fifth hierarchical level, three from the sixth hierarchical level, and three from the seventh hierarchical level. The above participants had active functions within the innovation project, ranging from being a sponsor at the top level of the hierarchy to a subproject manager down with functional tasks within the innovation program	Individual level / Team level / Organizational level

Table 38: Case Study II/Theoretical proposition 5 - Overview of the interview.

Source: Author.

The categories concerning the addressed theoretical proposition are:

Categories	
Accessible informal organization	Having access to informal key players who can influence the informal channels
Gain momentum	Being well received with an idea/innovation by the majority of employees
Supporting autonomous communication	Supporting the flow of and access to informal communication

Table 39: Case Study II/Theoretical proposition 5 - Categories from interviews.

Source: Author.

Informal channels are said to easing access to informal organization, resulting in the category “**Accessible informal organization**”. The informal organization is not formally institutionalized, but it has players with considerable authority and a lot of influence as others look up to them and follow them in their opinions. When informal opinion leaders are against an innovation and are spreading this rejection, this leads towards a resistance within their reach. When there is access to the informal organization, one can know how the informal organization or the opinion leaders are thinking about an innovation and try to influence such opinion leaders by engaging or winning them over and, by consequence, all followers of such opinion leaders.

“There is a huge variety of being formal. Our entire business structure is this way. And there's a reason for it. However we also have something informal where we have a codex we work like. As I say team work, I could approach somebody to be open. Maybe 60%, maybe a bit more of my team tell me something from their private side that is not what they have to discuss with their psychologists. That is maybe family. But I also have somebody in the team for example who didn't really like to speak that he/she is married. So it's the informal way that is based on the willingness of yourself to do that on a volunteer attitude. And if there is a channel for that you can develop wonderful things with people. I have examples where things were more or less informal and I could build up finally a labour agreement. Because the person who relied on what I said, on what we have agreed where are his/her points, where are my points and patience, was required until further decisions could be made. And then we said, OK, now it's the time... we can go on”. – B3

Gaining or having access to the informal organization or to opinion leaders is based on informal contacts. People can build up informal connections, such as the companies' “Thursday eve soccer”, where a director of the board might play against a mechanic and have drinks afterwards and so on. A direct effect of an accessible informal organization is that it offers insights about whether the informal communication is congruent with the formal communication, or whether attempts need to be made to influence or otherwise align formal communication with informal communication.

“Gaining momentum” is another important category, because resistance diminishes soon when an innovation achieves critical mass. Engaged exploitative players can create such momentum. The easiest way to gain momentum is said to be gained through persuasion. If key players can be convinced of its effectiveness, efficiency, or just because the new technology is fancier than the old technology, momentum can be initially built up, as the push force becomes a pull, and everybody is keen to work with the innovation despite their earlier doubts.

“People are often easier convinced in the informal way. I think that's human nature to some extent but a lot of it has to go formal. B4 had a very interesting case, where he/she explained: “So the basic question was at that time how to have a 180 degree flat bed, but not using more space than we had before. And before, the business class was stretched

out, but it was on a slope. On an angle, so you tend to slide down any case. So the thing is if you just put a bed into flat mode, you basically eat up two meters of the aircraft. And with that staggering, changing the passenger from here to here and sliding them together into their enlarged armrest, you have like a sleeping bag kind of thing. We could develop the most efficient business class. And it's still the most efficient business class in the industry. Coming back to the engineers. That would never have been possible according to an engineer. And I still have in my drawers and on my files feedbacks from seat suppliers, pages of the pages, where they explain me that it doesn't work because of XYZ. Would be too long to tell you every detail? And at that time he/she said, when he/she saw that idea, when this is going to work we found the egg of Columbus. And he/she had a strong support actually. And then he/she made it happen. First, we convinced the Airbus colleagues that it's a good idea. We made mock-ups. We showed them. We said "look, I know this is against this and this paragraph, but look at it, it's not that bad and think about that". When they wrote this paragraph they could not even think about staggering something. So that's why it's not really mentioned there. So we convinced the first people. They convinced the next ones. It was like an avalanche, you know. And at the end, we were there with certified product. And we are still happy with that, since 2009. From the layout side, it's perfect. And we really have the most efficient business class. That saves us millions per year. So that was a big innovation we have done. For the passenger it's just a lie-flat bed, because the passenger doesn't care how much space you're going to need. At the first stage at least. They just want to have... If I pay business class, I want to sleep and I want to have my bed and everything else around that. So innovation is always as well a big word. And it depends in which group you are. If you think that it is an innovation or if just think it's a development. I would say 80/90% of our work is more development work or incremental innovation if you like. And every now and then there is an innovation coming up. But it's quite rare, to be honest". – BI

Gaining momentum directly affects supporting autonomous communication and by nature offers support for fast and focused innovation. As a predecessor, the accurate transmission and spreading of knowledge is directly and positively affecting that building up of momentum.

Gaining momentum in favor of the innovation and getting the majority of people to support and accept an explorative activity facilitates the smooth transition of an innovation. This

supports another category, named “**Supporting autonomous communication**”. Supporting autonomous communication starts with getting key players on your side.

“I would say the formal has to be supported by the informal. I think that it is a key issue. I think it is not enough to do a perfect presentation of the management board and of the decision in front of the decision makers, you have to take a few guys by the hand and tell them:” Guys, that would be a really advantage for us”, and speak in an informal way, because then you also create interest and yeah, at the very end, I don’t know if it is trust, you are getting the guys on board. ... The more you inform, speak, discuss about innovation, the more people are losing their fear. It is something new, it has to do something a little bit with change management, you have to support, getting people prepared, because there is, let’s say, there is a barrier at the beginning for innovation, you have to convince and I think it is not always possible via the formal way, you need, let’s say, a lot of supporting activities, informal activities to prepare, to inform and ... it depends who is taking part in this informal interactions. As I said before, it is important who is doing the informal discussion and, yeah, if you are a person who is an opinion leader, it has of course to do something with leadership, yeah. That’s important”. – B8

B11 agreed that things start to move when people start to talk about an innovation, especially when they hear about it for the second time. This acts like a confirmation of something they have already heard, and they get used to it and assume it to be normal. Such supporting communication could be put into motion by key players who use their influence towards others and infect them by stressing the benefits of the innovation, horizontally across the organization or across hierarchical layers. Having this supportive autonomous communication directly affects the spreading of enthusiasm and positive lobbying, as key players are talking positively or even with visible enthusiasm about an innovation and thereby convince other players that the innovation is a good thing.

4.3.2. Findings from focus groups

4.3.2.1 Findings regarding theoretical proposition 1

Addressed proposition	Method	Participants	Unit of analysis
Proposition 1: “The know-how of exploitative key players, who mainly focus on incremental innovation, is sometimes consulted by explorative key players when it comes to decisions regarding radical innovations“	Focus Group	3 (total) Named by “B21“ to “B23”:1 from the fourth hierarchical level (Program Manager), 1 from the sixth hierarchical level, and 1 from the seventh hierarchical level. The participants were all involved in the innovation program and also took part in the interviews	Team level / Organizational level

Table 40: Case Study II/Theoretical proposition 1 - Overview of the focus group.

Source: Author.

The categories concerning this theoretical proposition are:

Categories	
Determined decision building	Decisions made are sounder due to the integrity of the information
Esteemed exploitative key players	Exploitative players who feel more appreciated with greater self-esteem

Table 41: Case Study II/Theoretical proposition 1 - Categories from focus group.

Source: Author.

After building up knowledge and opinions, decisions are made, usually in a formal and official way, which results in another category, i.e. “**Determined decision building**”. Beforehand, the observed process is that informal channels are used to build up an opinion about an innovation or a new technology. Interestingly, this process appears to constitute a weighing up of what others are thinking about an innovation. It is also used to make predictions about later meetings in which the different opinions about an innovation are taken into account. If one explorative player has to make decisions, he/she usually calls for a meeting to get the right experts around the table in order to make the official decisions. There, according to B5, an official risk evaluation is conducted, and everybody can voice their concerns, bring up issues,

and comment on the others' points of view. The final decisions are made here, even though lots of contacts have already taken place beforehand. Having the exploitative players on board in important decisions also supports their engagement; it seems worthwhile to involve them in the process.

“I would say allocating expertise. The explorative players should allocate expertise to the exploitative players. One example which is done in Swiss: if explorative players have a marvelous idea about a new specific technology development which looks fancy, about which the manufacturer says that maintenance is easy to be done and the explorative players would simply buy the specific technology and install it without having the technical department checking the technology before or making adjustments on the design, they wouldn't have the trust. But, telling the technical department: “We have a new specific technology in mind, it looks about like this, here comes the manufacturer, please take the technology to test it”. Actually asking for expertise, they involve the exploitative people, not only involve them by asking about their opinion, no-no-no, but also given to them a responsibility! Not only receiving information and feedback, but rather assigning responsibility. That helps”! – B22

Assigning accountability for the innovation is one way to engage exploitative players in the innovation process. Responsible people can hardly be defined as such without their actual commitment. This makes the process an evolving process, with exploitative players that are keen and support the innovation. Having a better understanding of a new technology and how exploitative players see it can then end in better decisions.

Another result that can be derived when inviting exploitative players in an iterative process is that their self-esteem or the feeling of being important might improve. The category that emerges in this respect is **“Esteemed exploitative players”** who are directly and positively affected by this iterative communication. It is appreciated when someone delivers knowledge and contributes to the general body of knowledge concerning an innovation. Often such behavior wins the contributors a certain amount of respect and, of course, acceptance. Being able to contribute to important decisions and being respected and accepted as an expert supports their self-esteem. Being listened to, having a stake in the outcome of an innovation improves the self-esteem of the exploitative players, which directly supports fast and focused innovation processes in the end. Engaging in iterative communication or asking exploitative players for advice

contributes to forming appreciated exploitative key players, because their specific expertise is being called on. B23 said:

“... when I have a new idea or something comes to my mind, I ask the most exploitative player I know, I have here a colleague of mine, and we sit together and ask him/her:” You as an expert on this...”, then you treat him/her already as somebody who is like your consultant, and then I explain, and then he/she is coming with his/her arguments, and it’s not that he/she is just saying No-no-no, but he/she then feels important because he/she is now my consultant and then suddenly he/she comes up already with ideas, even though he/she is exploitative. So, this is what I experience, to take the most resisting one and take him/her seriously and ask him/her about his/her special field. ...engaging them (exploitative players), taking them in their responsibility. Then, they are proud of helping you also with an innovation”. – B23

Exploitative players complain sometimes that they have no input or influence. Thus, choosing the right ones with certain influence and appeal to them for important input can be said to have positive and supportive effects.

4.3.2.2 Findings regarding theoretical proposition 2

Addressed proposition	Method	Participants	Unit of analysis
Proposition 2: “The know-how of explorative key players who focus mainly on radical innovation is sometimes consulted by key players involved in exploitative activities when it comes to decisions regarding incremental innovations“	Focus Group	3 (total) Named by “B21” to “B23”: Including 1 from the fourth hierarchical level (Program Manager), 1 from the sixth hierarchical level, and 1 from the seventh hierarchical level. The participants were all involved in the innovation program and also took part in the interviews	Team level / Organizational level

Table 42: Case Study II/Theoretical proposition 2 - Overview of the focus group

Source: Author.

The categories for this theoretical proposition are:

Categories	
Well grounded decision making	Decisions that are sound and supported by key players

Table 43: Case Study II/Theoretical proposition 2 - Categories from focus group

Source: Author.

Using direct informal channels can support the general understanding of an innovation when an exploitative key player has to make a decision as to whether or not an innovation might be able to improve his or her operations. When that exploitative player is given expertise about an innovation or its implementation, “**well grounded decision making**” can be the result. However, since exploitative players are frequently afraid of the change that innovations can bring, they are reluctant to contact explorative players or call on their advice or expertise. HRO exploitative players tend to stick to the defined processes.

“We are not Apple. In these companies, it would just be the opposite, but here we are flying in a high risk environment, and there is a danger that you are too innovative like “standing places in an aircraft only”, more people fit into the cabin, brilliant! More sales, brilliant! But what about safety, turbulence, and other issues?”. – B22

Exploitative players who would contact explorative players to receive knowledge and become better at making sound decisions do exist, but this is less frequent and depends on the exploitative players’ attitudes about change.

4.3.2.3 Findings regarding theoretical proposition 3

Addressed proposition	Method	Participants	Unit of analysis
Proposition 3: "There are some key players that support or hinder the integration of explorative activities into exploitative activities"	Focus Group	3 (total) Named by "B21" to "B23": Including 1 from the fourth hierarchical level (Program Manager), 1 from the sixth hierarchical level, and 1 from the seventh hierarchical level. The participants were all involved in the innovation program and also took part in the interviews	Team level / Organizational level

Table 44: Case Study II/Theoretical proposition 3 - Overview of the focus group

Source: Author.

The categories concerning this theoretical proposition are:

Categories	
Side changers	Players who were once explorative and later became exploitative or vice versa

Table 45: Case Study II/Theoretical proposition 3 - Categories from focus group

Source: Author.

“Side changers” are players who used to be exploitative and became explorative or vice versa. Exploitative players who become explorative are usually people who had a routine job in a routine environment. Such players can be leading or executive staff who become responsible for the implementation of an innovation. In this new function, they are not exploitative anymore, but indeed become explorative, as they shape the future with their implementation. Players designated to take over such functions are usually highly engaged professionals that are known as an authority within the company and highly regarded as such. On the other side, explorative players that become exploitative are usually professionals leading the implementation of an innovation in an explorative function, whose expertise about the innovation was so profound at the end of the implementation that they took over the operational and, by implication, exploitative function in the team or department where the innovation passed into everyday business. Side changers are said to be key players that have a vast understanding of the other side of the equation. Former exploitative players understand the fears of the exploitative workforce and neither forget where they came from nor how much opposition they had to deal with when

coming up with innovative ideas. They are able to talk the language of the other side, and they can put themselves perfectly into their situation. Side changers are also said to be capable of seeing the holistic view about the possibilities and constraints of an innovation, which makes them extremely influential and valuable players.

“In the beginning, I had almost only opposition, also Swiss-internal opposition, and knowing the right people and maybe changing their opinion to support innovation helped very much in the flight safety department. If you have them on your side, if they support you, it’s easier to bring an item and also innovation through. If they oppose it, if they say something like:” Well, you have to know, it’s your responsibility, but we do not support you definitely on that innovative idea”, it’s very difficult to bring an innovation through. We were able to convince these key persons to change their opinion and finally to support it and it’s having a rather big influence, not only at Swiss, but also within the Lufthansa Group”. – B22

B21 who is also a side changer had another example from an exploitative employee who had a brilliant idea and “turned” explorative. Another positive aspect of side changers is that they have to live with the implemented innovation, which brings in another incentive for sustainable implementation. Nevertheless, not all side changers are immediately supportive. They have to be respected by both sides.

4.3.2.4 Findings regarding theoretical proposition 4

Addressed proposition	Method	Participants	Unit of analysis
Proposition 4: “The interactions between different key players involved in explorative activities and exploitative activities have positive spillover effects in regard to the implementation of technological innovations”	Focus Group	3 (total) Named by “B21” to “B23”: Including 1 from the fourth hierarchical level (Program Manager), 1 from the sixth hierarchical level, and 1 from the seventh hierarchical level. The above participants were all involved in the innovation program and also took part in the interviews	Team level / Organizational level

Table 46: Case Study II/Theoretical proposition 4 - Overview of the focus group

Source: Author.

The categories concerning the theoretical proposition are:

Categories		
Enhanced respect	mutual	Improved respect towards each other/between two parties
Supported focused innovation	fast /	The effective and undisturbed implementation of an innovation

Table 47: Case Study II/Theoretical proposition 4 - Categories from focus group

Source: Author.

Being sincere and seriously listening to the other side results in **“Greater mutual respect”**. It is said to have a lot to do with getting to know each other, seeing each other and being able to have a word, formally or informally. Respect is gained through being an expert in a certain matter, or by having an appropriate attitude and showing others respect.

“We had a wrong technology installed, the technology installed was wrong, so I talked to the person who is in charge of it and he/she was like: ”Oh, you have to change it in all the aircraft”, and I was like: “Let me understand, wouldn’t it be easier for you to change it in your system, the one we have installed now in the aircraft, or just let me know, what would be exactly your work for changing it?”. And then he/she explained to me and I was like: “Oh, OK, so you have some hours to work on?” – “No, not hours” – “Ah, so how much you have for it, because if it’s too long, we tell all the manufacturer to change this”, then he/she was like: ”Oh no, you are right, I can do it maybe in a half an hour”, - “Would you do that?” – “Yeah, I do that, OK OK”. So I took him/her on his/her responsibility or on his/her accountability and suddenly he/she said: “OK, I change it on my system and not the whole world has to change.” This was his/her position before, the world has to change because it’s wrong. It’s not an innovation, it’s not an example of an innovation, but it’s the daily resistance I work with”. – B23

Exploitative players rarely become affiliated with an innovation or with the explorative players that are literally threatening to change their daily routines. However approaching each other with a certain respect for what the other side is contributing to the company is a prerequisite for establishing formal and informal communication channels. Receiving worthwhile knowledge

and, above all, accepting and carrying the decisions made by the others and trusting them will support the focused and timely implementation of innovations.

Therefore, a direct successive category is **”Supported fast and focused innovation”**. If an innovation is considered beneficial for the exploitative players, this encourages their specific endorsement of it. It was e.g. mentioned that the internal course for the new cabin of the C-Series aircraft was supported with a dedicated app for iPhones and tablets, which was well-received by the employees. They were very keen to get the first pictures of the new cabin and learn the new processes with this app. If there is something in an innovation for the exploitative players, they are likely to support it.

B23: “Invent something that gives something to them, then they accept maybe something with a clear advantage for them”.

B21 added: “Yeah, and involve them possibly quite early in the process. Some of them really appreciate to be involved that early and those people are capable to think out of the box. So they appreciate to be involved early and they come with good ideas as well. And then there are others, the so called “Beamten” (meaning supposedly lazy government employees) who are not able to think outside the box. They are perfectly right where they are. They follow rules, they follow regulations, they follow their boxes, their trolley size and galley size and that’s it. Don’t ask them for more. And the trick is to get the right people on board if you involve them that early. We had the same with cabin crew actually and in the unions, on the 777 project, we involved them extremely early, so from the first ideas already, and we had a good iterative process with them and came out with good solutions”.

Fully supported, fast, and focused innovation is the overriding goal, since costs can be saved, the fluctuation of “emigrants” can be decreased, and the innovation’s integration into everyday business is facilitated.

4.3.2.5 Findings regarding theoretical proposition 5

Addressed proposition	Method	Participants	Unit of analysis
Proposition 5: “Key players support the integration of explorative activities into exploitative activities through informal information interactions“	Focus Group	3 (total) Named by “B21” to “B23”: Including 1 from the fourth hierarchical level (Program Manager), 1 from the sixth hierarchical level, and 1 from the seventh hierarchical level. The above participants were all involved in the innovation program and also took part in the interviews	Team level / Organizational level

Table 48: Case Study II/Theoretical proposition 5 - Overview of the focus group.

Source: Author.

The categories concerning the theoretical proposition are:

Categories	
Positive lobbying	Positively advocating for something
Rumors	Negative information spread through informal channels
Regulations	Regulations by the FOCA and the ICAO

Table 49: Case Study II/Theoretical proposition 5 - Categories from focus group.

Source: Author.

An underestimated, but increasingly visible effect is the category of “**Positive lobbying**”. Lobbying is “to try to influence a politician or the government and, for example, persuade them to support or oppose a change in the law” (Hornby, 2000). In a corporate setting, the phrase refers to the finding that a lot of lobbying is taking place when trying to influence the governing body or the decision making body about a new technology or win over the workforce. Such lobbying is said to mostly be informal in nature. This implies getting in contact with decision makers informally, so that they can make up their minds about something when they have to make a decision later on in official meetings.

“I had to learn that lobbying was not to my own experience as important as is today. I was also in the belief that you prepare something, you go in front of a decision board, you have then the 15 or 20 minutes to explain the arguments and then you answer questions and then it comes to a decision and out you go with the decision. When a

colleague joined me about five to seven years ago from Lufthansa, he/she started in lobbying and I always wondered why we have then a management board decision item at the very end, if we are lobbying before. Meanwhile I have to say lobbying has even more influence than writing a good decision paper. I have seen in my own experience that during decisions, there have been no questions anymore because everyone's opinion was clear, it was just sort of, I would say, an administrative matter, to have it in the meeting minutes, that the management board approved it finally. It helped that you really pass by each decision body member, because when you meet in that rather small circle, the decision body member is open to ask questions, then you are able to answer that question. If that member is in a larger group, perhaps the member is feared to ask questions because the other colleagues could think: "well, that one doesn't understand, I have it crystal clear, why do we have that question". That's why I think lobbying is more and more, not only within Swiss, but general in aviation, more and more important". – B22

Important opinions are said to usually be fully formed before the actual meeting addressing them. Such lobbying is quite important, because it is said to be parallel to the hierarchical, official structure. It can therefore also be regarded as a breach of the rules, but it seems tacitly accepted. Lobbying, of course, also works from the top-down and horizontally throughout the company, when e.g. trying to involve opinion leaders or informal leaders to become lobbyists. It is said to be very powerful in order to gain momentum and finally be able to implement an innovation within the given time constraints.

The effects that positive downstream lobbying can have on an innovation can also be seen in its negative form, namely when **"Rumors"** harm the opinions about an innovation. Rumors are said to flourish when there is a divergence between what is being communicated officially and formally and what is being said about the issue in informal communication. A representative example would be when management is communicating something not immediately understandable, as the workforce or the project team then starts to read between the lines and becomes receptive to opinions from others. Rumors and distrust will follow, undermining the innovation's implementation.

"...what I see on that information exchange is perhaps another example, when us, the management, we issue an information, a bulletin, sometimes people tend not to read on

the lines but between the lines, and especially our department is a bit like fishermen, with a lot of rumors. They could create out of an “and” and “or”. Then the informal exchange following that communication is very important. That’s why we said: “Don’t simply issue bulletins or communicate, be there, walk in your factory, walk around in your factory, and our factory is an airline – we cannot walk around in every airplane but we can meet people when they check in, when they check out, we can be there at the same place”. – B22

Rumors were found to be avoidable by means of clear and straightforward communication, where no doubts are left about the contents of the information and additional, informally reinforcing communication. Engaged exploitative players also prevent the spreading of rumors, since they can clarify what was meant and, in particular, correct misunderstandings and prevent rumors in the first place. The existence of rumors does not support a fast and focused implementation of an innovation, and actually tends to paralyze organizations.

A decisive stakeholder in every innovation in an HRO environment is the regulator with the “**Regulations**” to be followed. The regulations require the respective operating organizations to conform in terms of the processes, materials used, training needed and so forth. They are by definition an unavoidable hindrance. Usually innovations, be it a process, a new avionic system, or something else that is being used in the operations, needs to be certified and undergo several highly standardized tests before it can be implemented successfully. But regulations are not only hindering innovation directly, but also indirectly by creating a special sort of “stick to the rule” mentality in airline personnel over the decades.

“In the case of a worker, he or she is trying to follow the rules strictly and that is something we see in our work all the time, if we talk to workers. Normally, they have difficulties to think out of the box, and they are already in their paragraphs and regulations when they are approached with a new idea. Let’s put it that way, it can be new material, new set-up, new something in the aircraft, at least for us speaking in the cabin where normally most of the innovation happens”. – B21

Since the aviation world is said to be small and becomes even smaller considering the range of influence of the FOCA, companies’ internal rumors might soon reach the regulator. Rumors can have therefore a direct negative effect on regulations as well. These regulations, even though

necessary in themselves, have a negative effect on the fast and focused implementation of an innovation, simply by influencing the array of innovation options, but also by diminishing the creativity of the people that are made to follow rules, not least in order to protect themselves legally against the consequences of potential disasters.

4.3.3. Findings from other sources

4.3.3.1 Findings from direct observation

Addressed proposition	Method	Time	Unit of analysis
Propositions 1to 5	Direct Observation	Observations were made and recorded throughout the whole case study	Individual level/ Team level / Organizational level

Table 50: Case Study II - Overview of the findings from direct observation.

Source: Author.

The categories relating to the theoretical proposition are:

Categories	
Mastering costs	Not diverting from the project budget or changing the approved scope

Table 51: Case Study II/Theoretical propositions 1to 5 - Categories from direct observation.

Source: Author.

Throughout the case study, several observations were made and recorded. Some derive from simply observing employees while working, others come from noting events that took place on site while not interviewing or officially doing research, e.g. when scheduling interviews or having lunch with the participants. B10 stated in an informal discussion (direct observation 4.7.2014) that innovations urgently need strong leadership and strong representation. Furthermore, he/she stated that when analyzing an innovation, the PLC (Product Life Cycle) has to be taken into account, as otherwise millions of Swiss Francs would be at risk. This supports

the category of “**Mastering costs**”. He/she also added that you have to have people in the right power circles, internal and external alike, e.g. good relations with some industrial or political players. It was found that the innovation implementation players were also looking for top management support, not only support from exploitative players. Another observation was the perceived feeling of being in a company with people who are, on one side, glad to be able to work there, but also under a lot of pressure. This was experienced several times when interview dates had to be postponed or the researcher received notice that the interview could not last longer than exactly one hour because the interview partner had other meetings (direct observation, 3.7.2014). The pressure, not only cost pressure, but pressure in general was always present at Swiss. Several interviews were over lunch, because this seemed to be a time the participants could spare. In the interview itself, the interview partners seemed mostly under stress, as observed in one case: When starting the interview with B8, another employee entered the meeting room and stopped the interview, because B8 did not book the room. The interview was relocated to his open space office where he/she proposed after 5 minutes to find another room where the discussion would be easier and less inhibited. Another room was found on the next floor, which was, unfortunately, again found to be pre-booked during the interview. The person who had booked it was then going to find another room (direct observation, 3.7.2014). Another direct observation supporting this category was the following: When agreeing on interview dates, the interview partner showed surprising openness and interest in the research, even though they had substantial workloads (direct observation, 25.6.2014). Mastering costs was a central issue for Swiss, as the company has to maintain comparatively high salaries in Switzerland while competing in an international market.

4.3.3.2 Findings from archival data

Addressed proposition	Method	Time	Unit of analysis
Propositions 1 to 5	Archival data	Access to archival data was offered on specific dates	Individual level/ Team level / Organizational level

Table 52: Case Study II - Overview of the findings from archival data.

Source: Author.

The categories relating to the theoretical propositions are:

Categories	
Spread enthusiasm	Carrying and transmitting the positive things that come with an innovation
Engaged exploitative key players	Exploitative key players who are engaged and involved by the explorative, implementation-leading personnel when implementing an innovation
Enhanced ideas	More ideas have been generated on how an innovation could be implemented/exploited
Iterative communication	Sharing of information that results in feedback which can in turn result in feedback
Transparent, receiver adjusted and fast formal communication	Transparent, timely, formal, official and accordingly addressed communication about events
Accurate transmission and spreading of knowledge	Knowledge is being shared in its true substance

Table 53: Case Study II/Theoretical propositions 1to 5 - Categories from archival data.

Source: Author.

Just as negative rumors can infect employees when they hear about or are confronted with an innovation, visible enthusiasm towards an innovation can have a positive effect regarding the attitudes towards it. **“Spread enthusiasm”** affects the behaviors of other employees. Usually, it is the job of the explorative players to propagate an innovation and make it a promising option; nevertheless, enthusiasm that is spread by exploitative players, as in the example of the app that was developed to train the crews regarding the new cabin interior of the aircraft, might support popularity even more. It is also positive when explorative players spread enthusiasm, as was done formally when senior managers of Swiss went on a supplier tour and visited the OEM Bombardier in order to inform themselves about the progress with the new aircraft to be delivered. Their statement, accompanied by a picture of them at the OEM in the internal newspaper Airmail, said: “Thumbs up! Bombardier’s CSeries Programme Director Robe Dewar (left), our CEO Harry Hohmeister and our Chief Technical Officer Peter Wojahn agree that the new twinjet programme is making good progress” (Swiss, 2014d). This is a role-modeling or lead-by-example effect in action, as simply spreading good gut feeling about an innovation also has a positive impact, since it helps people welcome the innovation, instead of refusing it.

The category of **“Engaged exploitative players”** was also supported. These can make a difference and become key players as stated once in the internal newspaper: “Our Kaizen program is also hugely important here – not least because it generates so many good ideas from

our people themselves” (Swiss, 2015a). Swiss has an established Kaizen program and achieved several process innovations with it. Usually, exploitative players are invited for Kaizen sessions, although some explorative players participated as well. These interactions are important in order to mobilize people, as was found when developing a strategy that should not remain lip service, but actually be carried out with vigor. “We’ve discussed these topics in various forms with a huge number of people from almost all our units and at various hierarchical levels. It’s been a really exciting process, and a great team effort: so many of our people have contributed already to our SWISS strategy. We didn’t just set off through the company armed with a thick catalogue for questions though we used every possible opportunity for discussion: be it at seminars for our cockpit and cabin crew, meetings or inputs from other major projects, like our Commercial Strategy on the Commercial Division” (Swiss, 2014a). The strategy was then distributed amongst the employees.

Apparently the simple availability of communication leads towards “**Enhanced ideas**” as stated in a article in the internal “Airmail”, presenting employees as an integrated part in defining the corporate strategy: “These discussions – for which, by the way, I’d like to say a huge thank-you to my team – produced a long list of topics. And to these, we then added some more long-term projects that have already been launched, like the Boeing 777-300ER, the Bombardier CS100 and our experiences in Geneva” (Swiss, 2014a).

“**Iterative communication**” was also supported, according to another article in the internal newspaper, for an idea generation event that took place. “And thanks to the participants’ various skills, their productive (and sometime heated!) discussion and a clear process to identify the best ideas, many of these ideas were developed from vague notion to concrete project all in just a day. A number of them are set to be implemented, too. The workshop offered a great opportunity to practice our Leadership Principles. It also enabled all the participants to learn more about their colleagues’ work and trade thoughts and ideas” (Lozeron-Gentile, 2015). Moreover, improved understanding, engagement, and an open culture were being cultivated within Swiss. Some exploitative players, such as pilots who are by the nature of their work removed from the company on the ground, might also enjoy sharing with other staff. Swiss started the so-called “New lunchmates” action, organized in the form of a lottery. One participant said: “I’m taking part (New lunchmates) because talking to colleagues from different parts of the company with different issues and perspectives really helps me see my own work and its demands in a different light. We may have totally different jobs; but we all work for the

same company and we all have the same goal of keeping SWISS successful” (Rellstab, 2015). Such actions clearly support the flow of information throughout the company and have a harmonizing effect on the information that is floating around.

The category **“Transparent, receiver adjusted and fast formal communication”** was also covered by a new platform that the aircrew can use to receive, but also to share information. The purpose of that new platform, “My SWISS talk”, is to communicate, but also to receive feedback. After going live, Swiss wrote an article in its “Airmail” with the following content: “Over 1200 colleagues have already installed the app, and there were more than 14’000 connections to My SWISS articles during the first week. The new facility earned just under 480 “likes” and 140 “dislikes”. We’re delighted to see such a positive uptake and active use of the new feedback channels ... My SWISS talk, the forum for cabin crew members, has exceeded all expectations with numerous discussions on a wide range of topics – from collective labor agreements to layover tips. ... We received a lot of very positive feedback about the new My SWISS layout, the interactive features and the push-messaging function in the app. There have also been many suggestions for other improvements. Many of you criticized the three-step log-in process imposed by the new SWISS IT security policy which is designed to protect external access to all internal platforms” (Swiss, 2015d). Swiss is transparently communicating any issues and problems, which also helps prevent rumors.

“Accurate transmission and spreading of knowledge” about an innovation is a key factor when implementing innovations. In order to support this, Swiss used another form of communication with worldwide reach to cover all employees, e.g. in the following form: “Our CEO Harry Hohmeister ushered in a new era for our company on Tuesday 19 August, when he presented our “Next Generation Airline of Switzerland” strategy at the latest News Xchange in Basel. The landmark event was transmitted live via webcast, enabling our people all over the world to follow along, ask their questions or voice their views” (Swiss, 2014b). Through these statements, rumors could be circumvented or mitigated at the least.

4.3.3.3 Findings from documentation

Addressed proposition	Method	Time	Unit of analysis
Propositions 1to 5	Documentation	Documentation was collected throughout the time spent on site	Individual team/ Team level / Organizational level

Table 54: Case Study II - Overview of the findings from documentation.

Source: Author.

The categories relating to the theoretical propositions include:

Categories	
Engaged exploitative key players	Exploitative key players who are engaged and involved by the explorative, implementation-leading personnel when implementing an innovation

Table 55: Case Study II/Propositions 1to 5 - Categories from documentation.

Source: Author.

That interactions with **“Engaged exploitative players”** are constructive and facilitate several advantages was found to be the case at Swiss, as long as the interactions have a clear benefit. That benefit could be that knowledge is being transferred in order to arrive at sounder decisions. The players’ engagement was highlighted in an interview in “Universum”, an independent and freely accessible magazine, with Ms. Sabuncuoglu, VP (Vice President) Ground Services at Swiss, stating: “Swiss fördert den Austausch über alle Divisionen und Hierachiestufen und setzt auf faktenbasierte Entscheidungen. ... Bei uns darf jeder mit jedem anderen Mitarbeiter diskutieren – auch mit dem CEO -, solange er faktenbasiert argumentiert.” [Swiss is promoting exchanges across all divisions and hierarchies and aims for fact-based decisions. ... Every employee is free to discuss with every other employee – as well with the CEO, as long as the arguments are based on fact] (Universum, 2015).

4.3.3.4 Findings from artifacts

Addressed proposition	Method	Time	Unit of analysis
Propositions 1to 5	Artifacts	Artifacts were received and collated throughout the case study when on site	Individual level/ Team level / Organizational level

Table 56: Case Study II - Overview of the findings from artifacts.

Source: Author.

The categories relating to the theoretical propositions are:

Categories	
Accurate transmission and spreading of knowledge	Knowledge is being shared in its true substance
Mastering costs	Not diverting from the project budget or the approved scope changes
Regulations	Laws from the FOCA and the ICAO
Transparent, receiver adjusted and fast formal communication	Transparent, timely, formal, official and accordingly addressed communication about events
Open culture/ transparency	Good and bad information are being shared openly
Elevated trust towards the source	The trust towards a person that is stating something has been improved as a result of a previous situation

Table 57: Case Study II/Theoretical propositions 1to 5 - Categories from archival data.

Source: Author.

The category “**Accurate transmission and spreading of knowledge**” is activated through several activities listed above. In the headquarters, internal course/education in Business Process Management was offered to Swiss personnel, with a flyer stating: “Gain knowledge about Swiss and the different departments, Understand processes and referred interfaces, Broaden your personal network, Think outside the box” (Swiss, 2014c). This would activate several supporting activities towards the accurate spreading of knowledge, getting to know each other, sharing information and knowledge, and building up trust by getting to know the players from other departments.

An extremely interesting artifact was the published “Swiss Corporate Strategy”, of which several elements were related to different categories. Some touched on “**Mastering costs**” as well as mastering complexity with the promise to “Improve efficiency and cost structure” and “Think Kaizen” (Dehne, 2014).

With regard to “**Regulations**” and “Leading change”, it was stated: “Regulations and a difficult political environment are limiting our entrepreneurial activities” where the answer is to offer attractive “New technologies” to win customer loyalty (Dehne, 2014).

An overarching claim of Swiss, positioned as such on the strategy map of the company, was: “We are true to ourselves and don’t pretend to be something we aren’t”. This can be referred to the category of “**Transparent, receiver adjusted and fast formal communication**”, the “**Open culture / Transparency**”, the resulting “**Elevated trust towards the source**” and as well to an “**Accurate transmission / spreading of knowledge**” (Dehne, 2014).

Category	Amount of findings						Total
	Interview	Focus Group	Direct Observation	Documentation	Archival Data	Artifacts	
Accessible informal organization	28	6					34
Accurate transmission / spreading of knowledge	17		2		3	2	24
Afraid of change	8	4					12
Aligned informal communication	76	2					78
Change resistant exploitative players	30	4					34
Determined decision building	44	9					53
Direct informal channels	87	2	1	2	1		93
Disclosed rumors	7						7
Disintegrated rumors							0
Deliberate listening		8					8
Elevated trust towards source	55	3		1		1	60
Engaged exploitative key players	61	12			1	1	75
Enhanced ideas	12	1			2		15
Enhanced mutual respect		9					9
Esteemed exploitative key players	22						22
Fanatic explorative key players							0
Gain momentum		5					5
Guided explorative key players	12	1					13
Improved practicability/feasibility	7	3			1		11
Improved risk management	9	1					10
Improved understanding of Innovation	54	18	1	1	1		75
Iterative communication		10	1	1			12
Open Culture / Transparency	31	3	4		3		41
Positive lobbying	30	10					40
Regulations	13	2				1	16
Rumors	9	2					11
Side changers	72	8					80
Spread enthusiasm		2			1		3
Strong leadership	12	6					18
Supported fast / focused innovation	5	11		1			17
Supporting autonomous communication	16	10					26
Trade unions		2					2
Transparent, receiver adjusted and fast formal communication	40	6		1	1		48
Well grounded decision making	14						14
Mastering costs	15	2	6			1	24
Total	786	162	15	7	14	6	

Table 58: Number of findings in the different categories of case study II.

Source: Author.



5. DISCUSSION OF THE RESULTS



5.1. Introduction

The previous chapter (“Empirical Results”) focused on presenting the best suitable and relevant findings from the case study database to explain the rationale behind the derived results. Furthermore, the displayed data also show the sometimes fine-grained, but in certain cases also relevant differences between the two case studies, mainly due to their different organizational setups.

In this chapter, the findings are first contrasted with related and, in some instances, also more remote literature in the relevant research streams of “innovation” and “ambidextrous organizations”, as well as other literature in the section “Discussion of the findings linked to the literature”. This is done to confirm the findings from other research projects, raise questions, and contradict some findings of other researchers. Other findings will also be taken up and discussed to further elicit and support these empirical results. In the same section of the findings, this also broaches some issue with surprising insights for the author and for the current body of knowledge about the subject being researched. Still, these surprising findings and their linkages are accepted as interesting and potentially important for other researchers, and they often give further reasons to support the propositions of this study. In the second section, “Discussion of the findings linked to the propositions”, the findings are matched against the theoretical propositions stated initially, belonging to two different families of propositions. As a principal result of this thesis, the propositions are confirmed or negated, depending on the empirical results that were found. After that, in the last section, called “Discussion of the findings linked to the main research objectives”, the findings are contrasted with the main objectives of the research.

5.2. Discussion of the findings linked to the literature

5.2.1. Findings linked to the literature of innovation

When a company engages in innovation, there are several distinct stages that each innovation passes through. It starts with the initiation and ends with the diffusion of the innovation. In the initiation phase of an innovation, Weick (1995) found that organizational members are first confronted with something new and intuitively perform a collective sense making process regarding the innovation. In this process, the organizational members gain awareness, receive

new information, and also share interpretations of how this new thing can influence their environment and what they could do about it or use it. This was readily observed in all of the informal communication and sharing of information that took place. Information is being spread, and knowledge is intentionally being tapped into by others within existing informal networks. Prahalad and Bettis (1986) found that this process leads towards a cognitive framing which filters out the relevant information to reduce ambiguity and therefore facilitate decision making. Peters and Waterman (2004) also found that in today's complex world, managers tend to trust "their gut" or people standing close, rather than written information. Similar were found in the case studies, where decision makers made up their mind about an innovation through contacting experts informally or formally in order to obtain information about a technology or type of innovation. The accurate sharing of knowledge and the willingness to do so were key findings of this research project. Sharing knowledge led to better and sounder decisions, as stated above, and it can also alleviate the concerns of people affected by the innovation. According to Ojasalo (2008), the sharing of knowledge improves the innovation capabilities of a firm, where the personnel in charge of innovation are allotted high importance, facilitating such processes especially in the ideation or initiation phase.

In the implementation phase of an innovation, leadership also plays a crucial role. Leaders have to be able to take over multiple roles that demand different skills (Mumford & Licuanan, 2004). They have to be able to nurture and support an innovation, e.g. by acting as a role model, and they have to guide the practical efforts. Another requirement regarding the leading players in the implementation is that they should be able to create the conditions needed for a successful implementation. This study showed that the leader has an immediate influence on whether or not an innovation is successful. It was also discovered that leaders have to give guidance, not only within the exploitative workforce, to reduce the ambiguity, but also for the so-called fanatic explorers, to lead them with a strong hand and clear guidance. Apart from leaders, the role of collaborators is also relevant. As Kelley (2008) stated, collaborators can leap organizational boundaries in order to get things done, like the implementation of an innovation. Along these lines, the findings of this study show that boundary crossing activities support the innovation's implementation and certain key players, called collaborators by Kelly, can make a difference. According to Kelley (2008, p.116), those collaborators can transform skeptics into "best friends".

Other studies found out that key success factors for implementation leaders are, amongst others, communication and collaboration (Adams et al., 2006). These factors have an immediate influence on the project's efficiency and duration. Identical findings appeared in this research project, as intensive and audience-adjusted communication was found to be a key success factor. Direct collaboration between innovation implementing and innovation applying players was also found to directly affect a successful phasing-in of such innovation within the users group, i.e. the ones who have to apply the innovation or technology in daily life.

There are different levels of analysis regarding innovation. On the top level stands the industry in which innovation is taking place. The next level of analysis is the organizational or corporational level. On the third level stands the subunit or the team, with its leader that is implementing an innovation. According to McCosh, Smart, Barrar, and Lloyd (1998), the person in the lead, be it the innovation implementing manager, the sponsor of such project, or a coalition that manages the implementation, has to be firmly supportive of innovation per se by their way of life, by role modeling, by their words, and by their deeds. This research confirmed that strong leaders are needed to transport a clear, transparent, and convincing message in order to stimulate and induce autonomous communication. Such leaders are also likely to spread enthusiasm about an innovation and lend support to its acceptance. Rivkin and Siggelkow (2003, p.300) found that “an active hierarchy is more valuable when subordinates are highly capable and interactions are dense” and “an active hierarchy is required to stabilize excessive search of smart managers”. They came to the conclusion that the more remote and dense the interaction between, for example, innovation implementation leading players and their equivalent leaders or sponsors, the more important and active the hierarchy is, in the sense of a clear line of what is expected from them. Such an active hierarchy also aims to counter excessive searching by managers or, as was found in this study, helps the explorative players in being guided by their supervisors in order to not run after each newer version of an innovation, but to close and implement one before jumping to the next fancy and attractive technology. The empirical evidence also led to the conclusion that innovation implementing staff have to be led and guided with a strong hand, as was also confirmed by Adler et al. (1999).

Rivkin and Siggelkow (2003) also found out that the resistance of employees towards an innovation can be overcome by involving them in the development and refining of an innovation. A direct engagement of affected players was also found to be a key success factor that allows an innovation to evolve successfully and be adapted to the needs of a corporation. Another critical

factor was the trust between the different hierarchical levels and the players involved in innovation. Adler et al. (1999) found that this directly influences effectiveness regarding the innovation's implementation, especially in an ambidextrous organization with divergent goals. Moreover, not only trust between the players was important, but also the trust in the managers sponsoring an innovation. Trust was found to be a lubricant that helps add momentum in the implementation process. In this research project, the same effect was found to be a prevalent condition to allow for the effective implementation of an innovation. Leadership and trust were found to be key preconditions for successfully implementing innovations and cope with the ambiguity in ambidextrous organizations. Trust has to be built up between players, or it has to already exist as a result of prior cooperation or experiences that players had with each other in other undertakings, according to Ojasalo (2008). This author also found that, in some cases, well-functioning innovation networks can also be based on trust and friendship. Such direct informal channels or friendships were also found in this study to be key for getting and spreading information and knowledge. It was also discovered that long-established connections between players that were built up over years and in which a reciprocal trust existed became key access points for decision makers. As an example, decision makers would frequently call former friends which they know have some expertise in order to get an unbiased opinion about an innovation or technology, rather than listening to the supposedly whitewashed formal information. However, trust has to be built up by proving oneself, i.e. by living up to the expectations that the innovation affected employees have towards the innovation implementation leading team or their leader.

Another key role is taken by the middle managers, as the point of liaison between employees and management when implementing innovation. Middle managers create staff buy-in by providing proof of the utility and applicability of an innovation, demonstrating its hands-on uses (Birken et al., 2012; Engle et al., 2016). Similar results were made in this study, as proof of the applicability of a technology or an innovation or simply the plain demonstration of it working, could take away all doubt or disbelief and even sometimes overcome resistance against an innovation.

Training was also found to be important in that it enabled first contact with a technology among the affected players. Training was also very important in order to get valuable and iterative feedback from the trial participants being trained. According to Engle et al., (2016) middle managers also have a closer link to the workforce, allowing for more profound informal communication. This encourages improvement, and allows so-called "dumb questions" to be

asked, which is rather less likely in formal communication. They also found that informal communication that was direct, transparent, multidisciplinary, and multidirectional was mostly found in well-performing sites, while only formal communication without outlets for feedback was associated with lower performance (Engle et al., 2016). The availability of direct feedback from staff was found to be directly associated with the successful implementation of an innovation and with a close relationship between implementation leading managers/middle managers and the wider workforce. Successfully supporting the implementation of an innovation was also closely linked with the use of special events and forums or even company-wide online meetings as channels to convey information. Kelley (2008) stated that criticism and honest feedback from the workforce is extremely valuable, because it allows top management to become informed about how things really are, as management can do something about this and improve the employees' morale if needed. The same was observed in this research, as the spreading and, in turn, receiving of information was tremendously important. This exchange of information was found to a large part to happen informally and especially between very well acquainted players. However, formal and informal communication has to back each other up, and it has to be transparent, which was also found to be eminently important regarding the credibility of the leading managers. Finding the appropriate person to lead an innovation is key, as Daft (1978) already stated. That person has to live up to the highest standard of professionalism, while also gaining the trust of the affected workforce. Having the appropriate person in place to lead the implementation of an innovation is the focal point in trying to make an implementation successful, also according to the findings of this study. Getting the right players on board that already have genuine credit in the workforce can indeed be said to be half the battle.

5.2.2. Findings linked to the literature on organizational ambidexterity

Organizational ambidexterity relates to a range of topics which were surveyed in chapter 2. A primary issue among them knowledge. Regarding knowledge, Weick (1990) found that the true meaning of knowledge is rendered possible through an active networking process that allow the involved people to engage together in sense-making interactions, discussing and interpreting the knowledge and imparting knowledge themselves. Such knowledge networking that happens within the context constituted by the exploitative and explorative parts can also end in a combination of old and new knowledge that finally leverages the existing knowledge of both

parts (Koza & Lewin, 2000; Lavie & Rosenkopf, 2006). The results of this study show that a sense-making process is indeed taking place at between all interacting levels and that it happens formally and as well informally. This was found to happen in formal, so-called brown bag meetings that were open to the public, including all employees interested in the new technology that was being implemented. It was also discovered that it similarly happened in other formal meetings as well as in purely informal interactions, by people talking about a current innovation next to other business issues or topics that had to be discussed. Another finding was that a combination of old and new knowledge can indeed be beneficial for both parties (Koza & Lewin, 2000). This was found to be the case as explorative players implementing an innovation became aware about lots of tacit expertise and risks regarding the innovation, by sharing and combining their knowledge about an innovation with the knowledge of the users of older technologies. A reverse flow was also observed, albeit less frequently. This was the case when an exploitative player became aware of the promise of an innovation by sharing and combining knowledge, and therefore managed to successfully apply the innovation or parts of it in his daily and exploitative business life.

Another topic related to organizational ambidexterity is strategy. Burgelman (1991) found that organizations have to establish selection mechanisms to assure coherence; otherwise strategy will not be realized. This research also showed that clear communication that embodies everyday tasks as well as plans for the future is important for the average employee to see the bigger picture and the sense behind investments in innovation.

Important guidance for the employee is provided by a clear statement of the broader priorities and expectations the management has concerning the workforce. Upright, honest, straightforward, and unambiguous communication from management was also found to be supporting the expectations and prepare the workforce for an innovation. If the sense of an innovation had been clearly explained, resistance towards it diminished.

However, leadership also plays a crucial role in such an undertaking. Lukas et al. (2016) suggest that leaders have to ensure alignment from top to bottom while, at the same time, managing integration across boundaries, which is supported by so-called “improvement initiatives”. The findings of this study also confirm the importance of such alignment, but surprisingly not only alignment regarding strategy and operations, but the alignment of formal and informal communication as well. The alignment between formal and informal

communication, like rumors and information not coming from official statements, is on a more subtle level than managing pure formalities. In some cases, managers were found to facilitate integration across boundaries through informal communication, whereas in other cases, integration was indeed hampered by them. An important factor was whether or not they were supporting official communication or whether they were contradicting it. It was found in this study that the so-called “side changers” were prime facilitators of integration, solely through their presence, which bridged boundaries. Taylor and Helfat (2009) also found examples where innovation implementing teams had cross-unit access to information and personnel with constant access to decision makers. Such actions were also found to support the spreading of knowledge and the establishment of links. However, an enforced top-down approach was not overly appreciated by the workforce in this study. A constant source of support for organizational ambidexterity was linkages that arose and evolved with the spreading of knowledge. Links had to be created, which was found to happen in organized formal gatherings, but also in informal ones. In formal innovation-oriented gatherings, information was offered about ongoing activities regarding the implementation, and questions could be asked, which also offered some insight about what the workforce knew and where more clarification was needed. Surprisingly, the workforce mostly knew less about an innovation than was presumed by management, but this helped managers adjust their information sharing and communication tactics. Gulati et al. (2012) also found that the establishment of these links can be incentivized by giving access to information, involvement, and prospects for influencing crucial decisions, and by rewarding the sharing of knowledge and information. Links, reciprocal dependencies, co-work, or more loosely coupled relations, including simple contacts, were also found to be beneficial for the implementation of innovations.

Another important aspect is trust. Interactions help build up trust, supported by reciprocal dependency because of knowledge, skills, and other resources, while at the same time improving the effectiveness of ambidextrous organizations (Jehn, Northcraft, & Neale, 1999). Raisch and Tushman (2011) call this “social construction”, acting like a fertilizer in supporting co-work, as social networks, cliques, and coalitions are crucial for successful ambidexterity and the implementation of innovation. The same was found in this study, where the social part appeared to have been neglected much more than it should have been. There are groups and players that are decisive for achieving success and therefore need more management attention. These cliques or informal networks might even become too important to be neglected. Kidder (1983) found that successful innovation can also be achieved when informal capabilities and informal

connections help circumnavigate formal barriers or hierarchies, or when informal abilities help avoid formal barriers. This case study found that there are lots of informal channels that act like a sensing instrument to get to know the opinions of others about an innovation or to tap into expertise about it, before official channels are being used, even if the decision has already been made. The informal structure or organization seemingly has considerable influence and power in ambidextrous organizations. Sorenson et al. (2006, p1010) states:

“Firms have both formal and informal structures that influence the degree to which actors within the firm interact with each other. Managers can influence who likely interacts with whom through the assignment of individuals to facilities, the design of laboratories and factories, and the structure of reporting relationships (Allen, 1977). To distribute knowledge effectively, a firm might usefully expend resources to foment close and dense social connections between sources and intended recipients of complex knowledge, while letting networks remain sparse elsewhere. Indeed, leaders might fruitfully construe the task of knowledge management not as the construction of central databases of information (as sometimes presented today), but rather as an effort to build social networks that match the nature and intended flow of knowledge.”

However, such knowledge-spreading social networks are getting stronger with reduced employee fluctuation in companies, combined with frequent internal job changes, as was observed in the case study. These networks can develop a very strong informal hierarchy that has lots of power, evolving and existing in parallel to the formal hierarchy. This and similar issues are more deeply analyzed in the chapter “Conclusions and implications”.

According to Adler and Kwon (2002), connectedness supports the development of trust and cooperation amongst players. Such connectedness allows the players to develop a better understanding of different disciplines within their business, which might support several aspects of the planned improvements. Furthermore, different backgrounds and diversified knowledge result in a broader perspective (Kimberly & Evanisko, 1981). On top of that, social relations support the sharing of experience about implementing improvements (Dyer & Nobeoka, 2000). These circumstances were also confirmed in the case studies that were conducted. With its substantial influence, trust was found to play a crucial role in both cases. There is a specific type of trust that is required according to Adler and Heckscher (2013, p.36-37):

“Ambidexterity depends on building a specific type of trust, one that is open and flexible. We call this type of trust “collaborative” (Heckscher & Adler, 2006). Collaborative trust is based on institutionalized dialogue and shared purpose. It differs from the three, more familiar forms of trust: the traditionalistic clan type based on status, loyalty, and deference; the charismatic type based on an shared emotional bond to a transcendent idea and an exemplary leader; and the contractual type, both of whose variants (bureaucracy and market) are based on individual autonomy, financial incentives, and administrative authority. (This typology of trust and the corresponding organizational models builds on sociological theories of Weber (1978) and his typology of social action.)”

The findings in this research project correlate with the above type of trust, which implies trust on a personal level regarding the different types of trust listed above. Such trust is also referred to by Nahapiet and Ghoshal (1998), which derives from relationships and the valuable social capital they bring. In a dialectical process, social capital is evidentially being created through social exchanges, and trust becomes a fertilizer for engagement in these social exchanges. Furthermore, Tsai and Ghoshal (1998) found that trust is not only a fertilizer, but also evolves directly from social interactions. In this research, trust was a central topic in many of the interviews and in the focus groups. Close-knit social relations or informal channels are effective coordination mechanisms with multiple benefits, such as a positive effect on exploratory and exploitative activities (Jansen, 2005; Tempelaar, 2010). Peters and Waterman (2004) go a step further and found that the best performing companies openly accept informal networks and acknowledge the fact that gossip has lots of power, which was partly also found in the case studies. Results from other studies show that informal coordination mechanisms are more important than formal ones (Hansen & Wernerfelt, 1989). A surprising finding in this research was the power and influence that the informal channels have. Peters and Waterman (2004) also argue that the informal channels are better control mechanisms than formal ones. What was discovered in the empirical part of this dissertation was that, in some cases, the company in question contemplated communicating all of the good and bad facts about an innovation project openly in order to preempt rumors. However, such an action would have only been taken once management became aware that there is a difference between what is being officially said and what the rumors are.

Such straightforward, open communication would, of course, be able to close the gap effectively. According to Peters and Waterman (2004), excellent companies are not just willing, but obsessed with sharing all of the information and avoiding secrets. Such behavior promotes transparency and trust. Peters and Waterman (2004) also found that excellent companies go another step forward to reach the shop floor, i.e. the lowest players in the hierarchy, to listen to criticism about, for example, an innovation. They are then willing to learn ‘from the bottom’. There were several findings in this research that confirm this, which showed that the innovation implementing players can learn a lot by simply listening to the people that are affected by the innovation. This formal process of listening could be avoided if the innovation implementing player had existing communication channels from previous socialization (Gupta & Govindrajana, 2000). Similar findings appeared in the case of the “side changers” who were thoroughly socialized within both the exploitative and the explorative workforce. These “side changers” were found to be facilitating the integration mechanisms by their sheer presence themselves, which represent, according to Jansen et al. (2009), informal social relations or connectedness (Tsai & Ghoshal, 1998), or formal cross-functional interfaces (Martinez & Jarillo, 1991). Side changers, with their cross-functional interfaces, would even act as integrators for the lower levels, which is regarded a very challenging aspect, according to Gilbert (2006), Westerman et al. (2006).

Like the “side changers”, who are associated most with positive effects, there are different roles affecting ambidexterity. Simsek (2009) defined the following roles in ambidextrous organizations: change agents, visionaries, mediators, networkers, boundary spanners, and integrators, with the “side changers” acting as a form of boundary spanner due to their role as integrators and mediators. Rosenkranz (2012) portrayed the role of the “boundary spanner” in similar terms as were encountered in this research project.

Another interesting point that was observed was that the ambidextrous organizational form changed on the longitudinal axis in one case study. In this case, the company was structurally ambidextrous. The company started with top-down designated players to initiate the innovation program and spark and control the process. As time passed, more and more players from exploitative functions took over, and even the program leader came from the routine side of business. However, the direct chain of command remained with the CEO, while the innovation implementing players were trusted representatives for the workforce. This is supported by Raisch and Tushman (2011) who state that, in the beginning of an innovation project, corporate

nurturing is essential to create a viable business, which later becomes obsolete once economic legitimacy has been gained. The company of the second case study, which was contextually ambidextrous, never had to transform, since innovation was organized within the exploitative workforce from the beginning. It never needed to prove itself, since it had legitimacy from early on. Birkinshaw and Gibson (2004) summarized some rules concerning how to succeed in building contextual ambidexterity. They stated that an organization has to build up social support and a context of trust. The term ‘leadership’ is named by them without referring to a specific model, i.e. plain leadership itself. The case studies are congruent with these findings as well.

Finally, with regard to centralization and formalization, Benner and Tushman (2003), Daft and Lengel, (1986), Jansen et al., (2006), demonstrate that a high level of centralization hinders exploratory or radical innovation, but incentivizes exploitative or incremental innovation. The findings in the case studies do not confirm these proposals regarding high centralization, as was seen in the first case study, where radical innovation was implemented within a structural ambidextrous context. The reasons for this might be the specific environment of HROs, where an innovation-averse workforce tends to stand in the way of radical innovation, while centralized leadership pushes for radically new solutions. However, the second case study showed that low centralization, implementing innovation in a contextually ambidextrous setup supported radical innovation. In this case, the findings are confirming the results of Benner and Tushman (2003), Daft and Lengel (1986), and Jansen et al. (2006). This might be due to the fact that, when a radical innovation is imposed from the top down, the workforce will not support it, while a radical innovation that comes from within the workforce and from well-regarded and accepted leaders is supported instead.

5.3. Discussion of the findings linked to the propositions

As referred to in chapter 3 on research methods, the theoretical propositions are either confirmed or not based on a systemic analysis of patterns and explanations (Miles et al., 2014; Yin, 2014) and also based on the evidence gained in the empirical study. Following this logic, the patterns and explanations of the different categories that emerged from this study, presented in the “Empirical results”, supply the required evidence to either confirm each theoretical proposition or reject them.

5.3.1. Theoretical propositions family 1: Boundary activities and the interplay between exploration and exploitation activities:

Theoretical proposition 1: The know-how of exploitative key players, who mainly focus on incremental innovation, is sometimes consulted by explorative key players when it comes to decisions regarding radical innovations.

Categories	
Determined decision building	Decisions made are more sounder through the integrity of information
Elevated trust towards source	Trust towards a person that is stating something has been improved by previous situation
Engaged exploitative key players	Exploitative key players who are engaged and involved by the explorative, implementation-leading personnel, when implementing an innovation
Enhanced ideas	More ideas have been generated on how an innovation could be implemented/exploited
Enhanced mutual respect	Respect towards each other/between two parties that has been augmented/improved
Esteemed exploitative key players	Exploitative players who feel more needed with improved self-esteem
Guided explorative key players	Explorative key players who are guided in the right direction by the input from the exploitative key players involved in the innovation's implementation
Improved practicability/feasibility	The innovation's transfer from implementation to usage has been improved
Improved risk management	Risk management that has been improved based on a previous situation
Improved understanding of Innovation	Exploitative players who understand better what an innovation and its functions are about
Iterative communication	Shared information that results in feedback that can again result in feedback thereof
Well grounded decision making	Decisions that are founded and supported by key players

Table 59: Overview of the categories relevant for theoretical proposition 1

Source: Author.

There seems to be a clear link between the explorative players asking exploitative players in different situations for advice, when they have to make decision about radical innovations. These interactions include almost only positive effects when such key players engage in interactions.

Exploitative players get a better understanding of an innovation, answering the “Why we are innovating” question, and also reduce the fear of an innovation. The results of such interactions often lead to an improved exploitation of the innovation, because the exploitative players can supply knowledge that can improve the later use of the innovation. Another important factor is that exploitative players support managing the risks that comes with a new innovation and the newly required skills. Exploitative players are usually found only familiar with the existing technology, but they usually can tell where the weak points with the new technology might be, since they are using the existing technology, and what resilience is needed from the new technology. Improved risk management is the most immediate result of such interaction. This results in improved practicability and in a greater likelihood of the innovation’s implementation in a company. If interactions are iterative, they can fortify the positive effects, because the more interactions, the better both sides get acquainted with each other, and the better they understand each other’s role, which may finally lead towards greater mutual respect. It has also been found important that the exploitative players, usually the majority of the workforce, start to feel appreciated and taken seriously through frequent conversations with the explorative players, and therefore feel able to contribute to shaping their own fate. These interactions guide the explorative players in a gentle and smooth way which is mostly also in their interest. The improved risk management is also important, because the people who are usually consulted also have to live with the innovation later on, when it enters routine business. An important factor is that decision making can improve as a result.

In both case studies, there were no differences regarding the categories or their allocation with regard to theoretical proposition 1.

Theoretical proposition 2: The know-how of explorative key players, who mainly focus on radical innovation, is sometimes consulted by key players involved in exploitative activities when it comes to decisions regarding incremental innovations

Categories	
Afraid of change	Players that are affected by the innovation and that are therefore afraid of the consequent changes that it might bring
Determined decision building	Decisions made sounder due to the integrity of information
Direct informal channels	Having informal channels between players without having a formal, internal or hierarchical connection
Elevated trust towards source	The trust towards a person that is telling something has been improved regarding a situation beforehand
Engaged exploitative key players	Exploitative key players that are engaged and involved by the explorative, implementation-leading personnel, when implementing an innovation
Enhanced ideas	More ideas have been generated on how an innovation could be implemented/exploited
Guided explorative key players	Explorative key players that are guided in the right direction by the input from the exploitative key players that are involved in the innovation implementation
Improved understanding of Innovation	Exploitative players who understand better what an innovation and its functions are about
Strong leadership	Leaders that actively take the lead with a strong hand
Well grounded decision making	Decisions that are founded and supported by key players

Table 60: Overview of the categories relevant for theoretical proposition 2

Source: Author.

The interactions that the explorative key players have with exploitative key players are mostly positive. Nevertheless, exploitative key players do not contact explorative key players as often as vice versa and only for different reasons. One major reason is that exploitative players are sometimes afraid of the changes that explorative players usually bring when appointed as implementation leading persons. However, if exploitative players contact explorative players, it mainly has positive effects, mainly the same ones as for proposition one. Another important aspect is the fact that sometimes a radical innovation indeed has positive spillover effects that can be used as incremental innovation in an exploitative unit. Exploitative players then get a better understanding of the radical innovation and get to know how it might be used in their exploitative work. Frequent and often informal contacts, when already acquainted, also leverages

trust towards explorative players. One infrequent negative impact is that the fear of change that lots of exploitative players have stops them from contacting explorative players, as found in the empirical survey. In this sense, one major factor that should not be underestimated is that when they are in frequent contact with each other, both exploitative and explorative players acquire a better and more profound sense of what is needed. Often explorative players get to understand better how far they can go in terms of safety, feasibility, and so on. This form of guidance can come from exploitative players, but it is also expected from leaders, especially with regard to the specific requirements of an HRO. Finally, the exchange also leads towards more determined decision making as to whether or not a radical innovation can be used in exploitative operations, and, therefore, to a sounder decision making process, since the innovation was analyzed from different points of view.

Regarding the differences between both case studies, it was a surprising finding at Swiss, where the innovation implementation personnel was organized in a contextually ambidextrous context, that the workforce was seemingly less afraid of change. The reasons might be that the workforce knew that “their” people are leading and, therefore, not implementing anything unusual that might not work at the end and put safety at risk. Furthermore, the innovation implementation leading team at Swiss had to fight more for decisions in favor of innovation against the management, whereas at skyguide, it appeared that the innovation implementation team had to fight more against the workforce. Taking all of this together, it appeared that certain mechanisms with the workforce of Swiss supported alignment towards a decision and, at the end, only the management needed to be convinced about something, whereas at skyguide, with its structurally ambidextrous setup, the management pushed for innovation and the whole workforce needed to be convinced, which was finally a more intricate, extensive, and exhaustive task. The decisive question for management seems to be how to organize the implementation of an innovation. When the innovation implementation team is not formed from contextually ambidextrous players, the innovation might not end up as radical as initially hoped for, but it did work. When such a team is organized in a structurally ambidextrous context, it always has to fight the fact that the unit or team is “different” compared to the vast majority of exploitative players. A legitimate question might be how radical an innovation is, and an answer might be that the more radical it is, the more a structural differentiated unit or team has to implement it. However, the involvement of the exploitative workforce is a key success factor in any case.

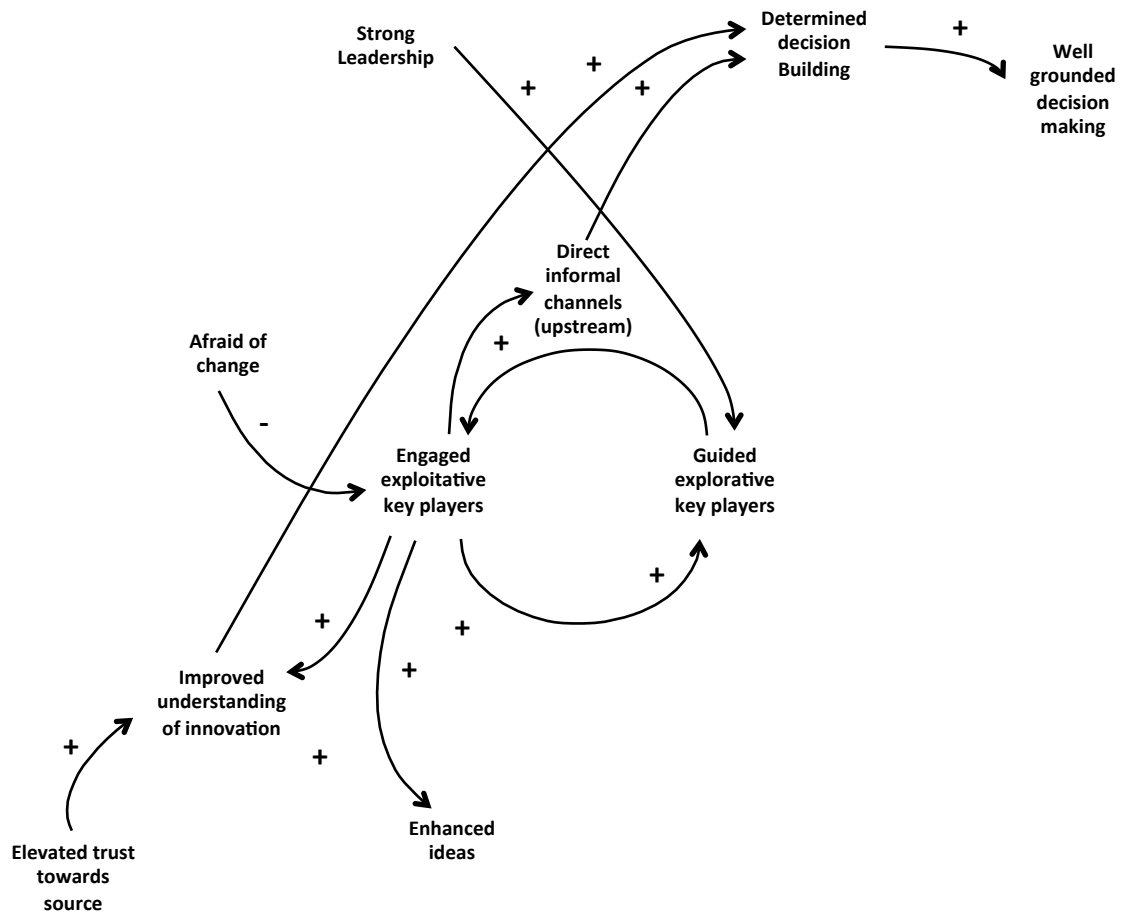


Figure 6: Theoretical proposition 2: Cause and effect pattern

Source: Author.

5.3.2. Theoretical propositions Family 2: Different key players' roles

Theoretical proposition 3: There are some key players who support or hinder the integration of explorative activities into exploitative activities

Categories	
Accurate transmission / spreading of knowledge	Knowledge is being shared in its truly substance
Aligned informal communication	Degree of how much the formal communication is equal to the informal communication that is taking place
Change resistant exploitative players	Exploitative players who are resistant to change and don't endorse new ways of doing something
Determined decision building	Decisions made sounder due to the integrity of information
Direct informal channels	Having informal channels between players without formal, internal or hierarchical connection
Disclosed rumors	Rumors that are made public and addressed officially
Disintegrated rumors	Refuted rumors without effect
Elevated trust towards source	The trust towards a person that is telling something has been improved as a result of a previous situation
Engaged exploitative key players	Exploitative key players that are engaged and involved by the explorative, implementation-leading personnel, when implementing an innovation
Fanatic explorative key players	Explorative key players that are fanatical about innovations and do not manage to implement them in practicable/useable form
Gain momentum	To be well received with an idea/innovation by the majority of employees
Improved understanding of Innovation	Exploitative players who understand better what an innovation and its functions are about
Iterative communication	Shared information that results in feedback which in turn results in feedback
Positive lobbying	Positively advocating for something
Side changers	Players who were once explorative and become exploitative or vice versa
Strong leadership	Leaders that actively take the lead with a strong hand
Supported fast / focused innovation	Effective undisturbed implementation of an innovation
Supporting autonomous communication	Supporting the flow and the opportunities for informal communication
Trade unions	Trade unions of the workforce
Transparent & fast formal communication	Transparent, timely, formal, official communication about events
Mastering costs	Not diverting from the project budget or changing the approved scope

Table 61: Overview of the categories relevant for theoretical proposition 3

Source: Author.

There are several key players that can support or hinder an innovation in its progress. Innovations usually evolve positively with the interactions that the exploitative players have with the explorative players. For example, a convinced exploitative player can be of immense support when implementing an innovation, since he/she can easily act as a link between explorative players and the majority of the workforce, i.e. the exploitative players. One type of supportive player identified here is the so-called side changer, who once had been exploitative and became explorative over time, or the opposite around. Side changers understand both sides, they talk both sides' language, and they are often well respected on both sides. Other key players are, for example, senior managers who have a clear line, make well-founded decisions, and act as some sort of standard bearer for an innovation. They should communicate transparently, fast, and formally, but also informally, to back up formal communication and penetrate the informal organization. Transparent communication also means communicating candidly about current problems, and maybe even broaching rumors officially, and telling how something really is, even when it is bad news. The key was found to be transparency. With it, the informal organization can be aligned, which is important in terms of the credibility of the source that is communicating something. Having an aligned informal organization implies spreading accurate knowledge about the innovation that is being implemented. This, together with key players who can support the autonomous spreading of an innovation, can help reach a momentum where resistance toward something new is diminishing.

A negative effect for any innovation can appear if there is a gap between formal and informal communication. For example, if formal communication praises the potential of a technology that is currently being implemented, but rumor has it that it is not working as promised, this becomes poison for the effective implementation, since the workforce will not believe in it. The closer the informal communication is to the formal, the better for the implementation of the innovation. Another important fact is that there are key players who have a lot of weight when decisions are being made. It was discovered that often the decisions to be made were already made, before the meeting with the decision on the agenda ever took place. This happens because key players are consulted and asked about their opinion. It is also perceived that some sort of gauging of the different opinions appeared when forming one's own, so that the meeting then becomes only a formal waving-through of the decision by all participants, while everything had already been informally decided beforehand.

Interesting differences between the two case studies were found regarding the handling of costs. At Swiss, every idea that came up was discussed within the innovation implementation team, whether or not they managed to convince management to invest in a new idea or a new technology or gadget. At skyguide, the question was instead whether or not the workforce would accept an idea or a gadget. The reasons for this are similar as with theoretical proposition one, which seems to relate to the different organizational set up. Leaving the innovation to the contextually ambidextrous workforce (this is the case at Swiss), people come in with initiatives which have to be waved through, while in a structural ambidextrous context (the case of skyguide), where most of the innovation ideas come from structurally separated units, the majority of the workforce has to wave unfamiliar ideas through. Another interesting difference was the way that the informal channels worked. At Swiss, it was all about informal channels upstream to the deciding managers, whereas at skyguide, it was about informal channels downstream to the informally deciding opinion leaders. This is indeed a very interesting difference, since it shows how important informal channels are required to convince others. The reasons for why in one case the upstream and in the other case the downstream channels were important are believed to also relate to the different organizational setups. Another interesting difference is the handling of rumors within the workforce. Swiss did not have to strongly fight rumors. This might be the case because there were established communication channels that assure the proper spreading of accurate information, leaving much less space for rumors.

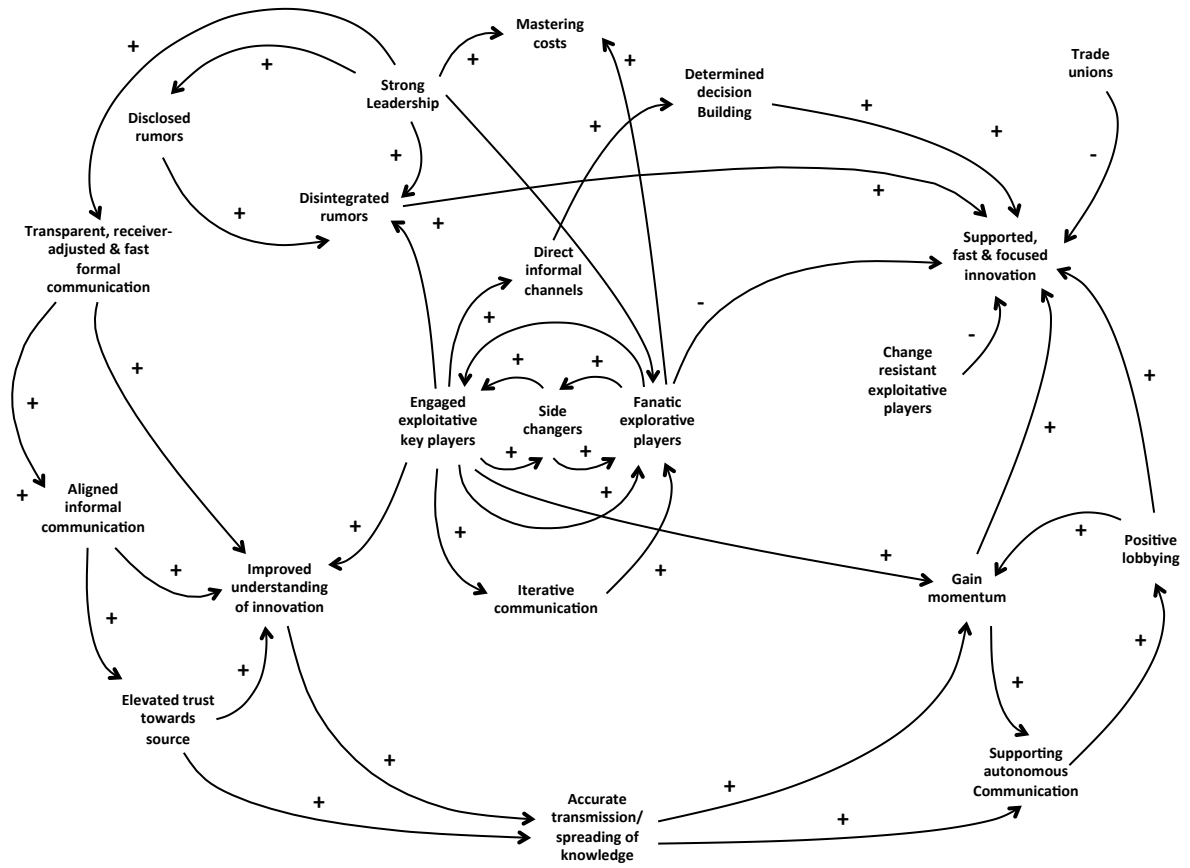


Figure 7: Theoretical proposition 3: Cause and effect pattern

Source: Author.

Theoretical proposition 4: The interactions between different key players involved in explorative activities and exploitative activities have positive spillover effects with regard to the implementation of technological innovation

Categories	
Accurate transmission / spreading of knowledge	Knowledge is being shared in its truly substance
Direct informal channels	Having informal channels between players without having a formal, internal or hierarchical connection
Deliberate listening	Listening thoroughly to what is being said and trying to understand it
Elevated trust towards source	The trust towards a person that is telling something has been improved as a result of a previous situation
Engaged exploitative key players	Exploitative key players that are engaged and involved by the explorative, implementation-leading personnel when implementing an innovation
Enhanced ideas	More ideas have been generated on how an innovation could be implemented/exploited
Enhanced mutual respect	Respect towards each other/between two parties that has been augmented/improved
Esteemed exploitative key players	Exploitative players who feel more needed with an improved self esteem
Gain momentum	To be well received with an idea/innovation among the majority of the employees
Guided explorative key players	Explorative key players that are guided in the right direction by the input from the exploitative key players who are involved in the innovation implementation
Improved practicability/feasibility	The innovation's transfer from implementation to usage has been improved
Improved understanding of Innovation	Exploitative players who understand better what an innovation and its functions are about
Iterative communication	Shared information that results in feedback that can again result in feedback thereof
Open Culture / Transparency	Positive and negative information being shared openly
Spread enthusiasm	Carrying and transmitting the positive things that come with an innovation
Strong leadership	Leaders that actively take the lead with an strong hand
Supported fast / focused innovation	Effective and undisturbed implementation of an innovation

Table 62: Overview of the categories relevant for theoretical proposition 4

Source: Author.

There are several positive aspects coming from the interactions between players involved in explorative and exploitative activities, in addition to the ones already stated above: interaction

supports the commitment towards an open and transparent culture. One tremendously important factor is the explanation of “why” something is being implemented. Exploitative players are sometimes afraid of an innovation and if the “why” can be explained to them and shown what is in it for the exploitative workforce or how their job is made easier, this supports the acceptance of an innovation. A saying that supports this finding is “information equals motivation”. When innovations facilitate the everyday work of the exploitative players and this can be made visible, their adoption will usually happen very fast. Having several interactions between exploitative and explorative players adds opportunities for listening to each other, which is essential in order to enhance mutual respect and also to really understand not just the technology and its potential, but also everybody’s roles contributing to the implementation of the innovation. Having more interactions can also lead to greater momentum in the workforce. Iterative communication between the exploitative and explorative workforces, with deliberate listening to which inputs are being processed, brought back, and verified by the other party, is found to be a very valuable tool for implementing an innovation. It leads to esteemed exploitative players, since their input is taken seriously, which leads them to support the innovation in the end. This, in turn, leads to support for a fast and focused implementation of the innovation. Furthermore, deliberate listening inherently aids greater mutual respect between both sides that can develop more direct informal channels for future innovations. Again, strong leadership is found to be very important, since it can incentivize these interactions.

It can be concluded that basically all interactions support the implementation of technological innovation, since knowledge is being spread, respect towards each other improved, and the interactions prepare the exploitative workforce for better acceptance of an innovation and diminish the fear of it.

With regard to theoretical proposition 4, there were no significant differences between the two case studies. The contrary is the case, as the results were perfectly matched.

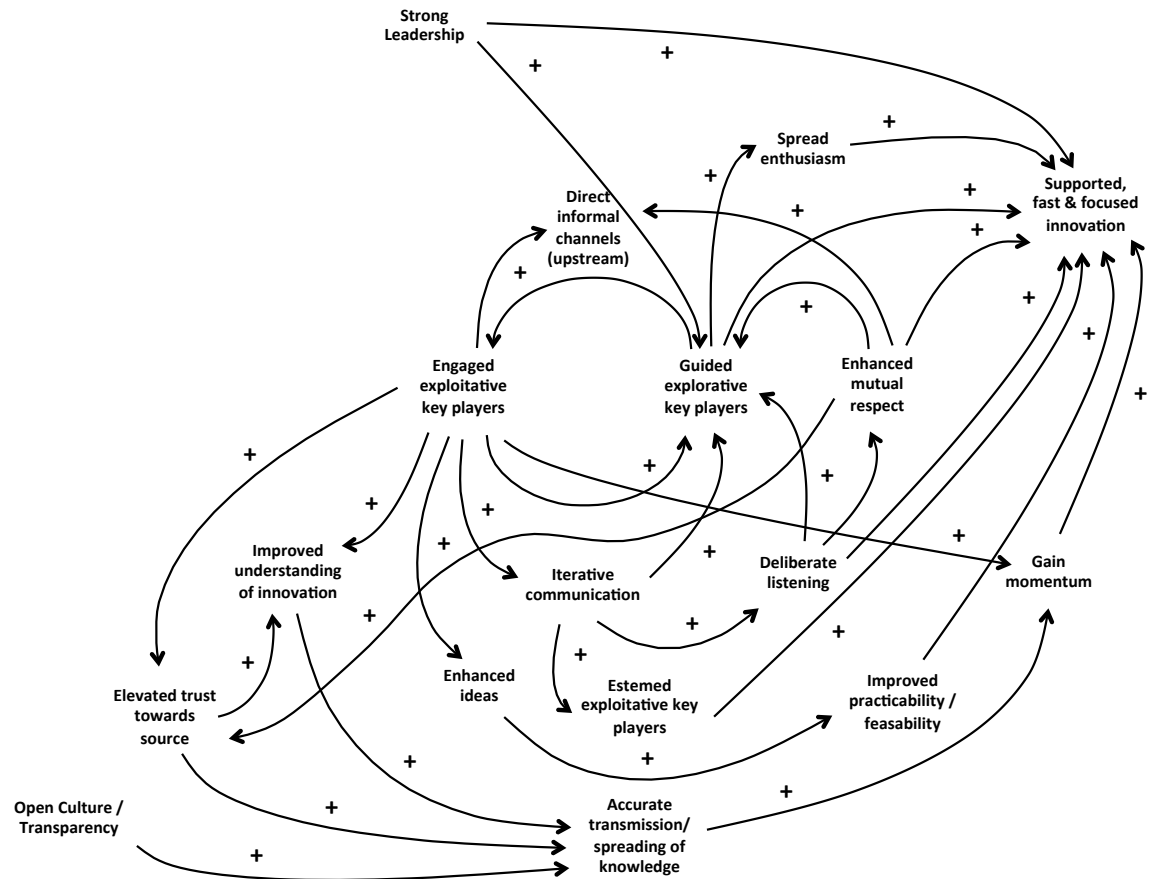


Figure 8: Theoretical proposition 4: Cause and effect pattern

Source: Author.

Theoretical proposition 5: Key players support the integration of explorative activities into exploitative activities through the informal sharing of information between themselves

Categories	
Accessible informal organization	Having access to informal key players that can influence the informal channels
Accurate transmission / spreading of knowledge	Knowledge is being shared in its true substance
Aligned informal communication	Degree of how much the formal communication matches the informal communication that is taking place
Determined decision building	Decisions made sounder due to the integrity of information
Direct informal channels	Having informal channels between players without having a formal, internal or hierarchical connection
Elevated trust towards source	Trust towards a person that is stating something has been improved by previous situation
Engaged exploitative key players	Exploitative key players that are engaged and involved by the explorative, implementation-leading personnel, when implementing an innovation
Gain momentum	To be well received with an idea/innovation among the majority of the employees
Guided explorative key players	Explorative key players that are guided in the right direction by the input from the exploitative key players that are involved in the innovation implementation
Improved understanding of Innovation	Exploitative players who understand better what an innovation and its functions are about
Positive lobbying	Positively advocating for something
Regulations	Laws from the FOCA and the ICAO
Rumors	Information that is spreading on the latrine channel
Spread enthusiasm	Carrying and transmitting the positive things that come with an innovation
Supported fast / focused innovation	Effective and undisturbed implementation of an innovation
Supporting autonomous communication	Supporting the flow and the possibilities of informal communication
Well grounded decision making	Decisions that are founded and supported by key players

Table 63: Overview of the categories relevant for theoretical proposition 5

Source: Author.

As the proposition states, the informal sharing of information supports the integration of explorative activities into exploitative activities. There are several cause-effect relations that support the proposition, with a focus on the “informal”. The most important aspect of the

informal sharing of information between key players that supports the integration of an explorative activity into an exploitative one is that they can gain access to the informal organization. The informal organization is being led by opinion leaders that can, but do not have to be, formal leaders. Through access to that informal organization, the innovation implementation team gets knowledge about what the workforce is thinking and speaking about and also which rumors or wrong information might be spread. This creates an opportunity to address such issues publicly, for example, with newsletters or public announcements. This leads to an accurate transmission and spreading of the actual truth. The correct and meaningful knowledge can stimulate supporting autonomous communication, introduce positive lobbying, and add to the general momentum. Informal communication, as already stated in the propositions above, supports the decision making processes, which leads, together with the accurate transmission of knowledge, to a faster and more focused implementation of the innovation. However, other forms of informal communication, like rumors or existing informal channels with regulatory entities, can harm the integration of explorative activities into exploitative activities as well and become a major obstacle to be overcome.

Finally, there were differences between the two case studies. At Swiss, the informal organization seemed to be more aligned than at skyguide. It is thought that, again, the organizational setup is the reason behind this. In the case of Swiss, a contextually ambidextrous organization, the innovation implementation team always had its roots in the exploitative workforce, where it could directly inform and spread information more easily and therefore also fight any rumors instantly.

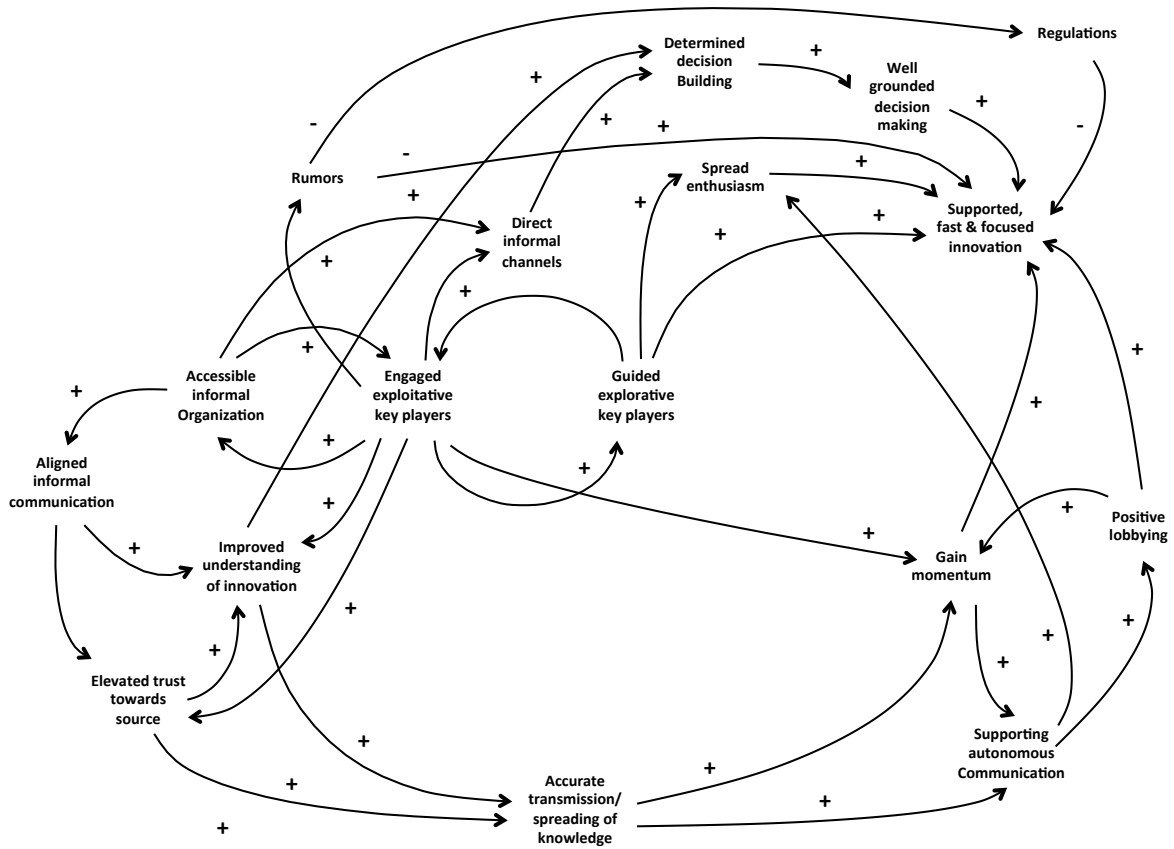


Figure 9: Theoretical proposition 5: Cause and effect pattern

Source: Author.

As a summary of the findings explained above, the following can be concluded:

Theoretical proposition 1: The know-how of exploitative key players, who mainly focus on incremental innovation, is sometimes consulted by explorative key players when it comes to decisions regarding radical innovations.

Proposition 1 has been confirmed. At a company with a certain history and where the players know each other, there is a clear tendency to talk to each other formally, but above all informally, when it comes to decisions regarding an innovation. Decision makers try to make the best decision and therefore gather as much information as possible from as many different sources as needed. However, this sharing of information usually takes place on an informal basis, since there is often no official link between the different kinds of players. The findings obtained in this research confirm the proposition, since it appeared plausible for almost every interviewee

to ask the main expert on a currently used technology about his or her opinion about a new technology or radical innovation. This seems to be the most natural thing to do in professional life.

Theoretical proposition 2: The know-how of explorative key players, who mainly focus on radical innovation, is sometimes consulted by key players involved in exploitative activities when it comes to decisions regarding incremental innovations.

The second proposition has been confirmed, albeit with a much less intensity than was the case for proposition 1. Exploitative players do sometimes contact explorative players about decisions that have to be made about incremental innovation. However, it was often stated and referred to, that this happens very much less than in the opposite direction. Whether or not an exploitative player would have innovation on his or her radar depended substantially on the interest and will to stay on top regarding technology.

Theoretical proposition 3: There are some key players who support or hinder the integration of explorative activities into exploitative activities.

There were several players who would support or hinder the integration of explorative activities into exploitative ones. Leaders and sponsors of innovation, for example, play a crucial role, as do innovation implementing players and several informal opinion leaders. It was found that there are some players who can facilitate or hamper the successful integration of explorative activities into exploitative ones. This proposition can therefore be confirmed: The results show especially how much influence certain not officially involved players can have regarding successful integration. This result is relevant, because this aspect has generally been neglected in the literature on ambidextrous organizations, and it should be taken into account more in the future.

Theoretical proposition 4: The interactions between different key players involved in explorative activities and exploitative activities have positive spillover effects with regard to the implementation of technological innovation.

The results show that interactions between exploitative and explorative key players always have positive spill-over effects with regard to the implementation of innovations, because knowledge is being spread, trust increases, knowledge networks grow, concerns about innovations diminish,

and the workforce's involvement generally intensifies. Therefore, it can be concluded that this proposition is also confirmed. Another important finding is that trust plays a crucial role. The confirmed proposition is considered relevant, because communication and interaction between different key players have not to date been considered an important aspect in the literature on ambidexterity.

Theoretical proposition 5: Key players support the integration of explorative activities into exploitative activities through the informal sharing of information between themselves.

Proposition 5 was found to be confirmed with reservations, mainly because the informal communication and sharing of information can have an opposite effect regarding the integration of explorative activities into exploitative ones. The informal sharing of information that is based on the transparent and accurate spreading of knowledge was found to be supportive in all cases, but informality has two sides, and one side is hard to control and can harm the integration of explorative activities. Under certain circumstances, as mentioned above, the informal sharing of information is beneficial, but not in every case.

5.4. Discussion of the findings linked to the main research objectives

As explained in chapter 1, the main objective of this research project was to find out how and why key players support the successful implementation of a technological innovation, and how the interplay between explorative and exploitative players might influence this. In the “how” question as a first instance, it was logically found that players welcoming and approving innovation or new technology would support a successful innovation. Next to this, any type of players can support a successful innovation project by actively sharing knowledge and expertise, through engagement and involvement, and through transparent communication. Key players also support successful innovation by promoting the innovation or new technology within the company and, therefore, infect others with their enthusiasm for it. Moreover, key players also support successful innovation through determined and unambiguous leadership and through fighting rumors. The key for supporting an innovation seems to lie in facilitating acceptance and support for it within the workforce and management as well. The key players who are able to generate and maintain the needed trust among the workforce and the management, while

mobilizing the necessary contributors and fellow employees, would be best suited for the requirements of the designated implementer.

The other question, i.e. “why” key players support a successful innovation, cannot be answered as directly. It can be assumed that every single player who is convinced about an innovation or a new technology would supporting it automatically. However, such key players have to be convinced first that the innovation is indeed a good thing and become ambassadors for the innovation at the company. A reason for why certain players support the implementation of an innovation might be the options that come with innovation, like taking over new responsibility or simply working in a different environment than in the past. Sometimes, players might support an innovation because they are told so by the management, or forced to do so by a joint decision with their colleagues, even though they personally would not support it as much. What has been found in this research is that players that are convinced about an innovation are most persuasive for others, which can lead towards the momentum needed to win over the majority.

Another research objective was to find out how the interplay between the exploitative and explorative players influences the successful implementation of innovations. The two different organizations were studied with this in mind. In one case, the innovation implementation was organized, so that the explorative units were structurally separated from the exploitative ones (structural ambidexterity), while in the other case, the explorative and exploitative units were not separated (contextual ambidexterity), which means that players from everyday business took over the implementation while staying explorative. These different organizational setups that were initially decided by the management of each company, resulted in different advantages and disadvantages. It was found that the coordination of the explorative and exploitative units or teams, when structurally separated, was tougher and depended on the management’s actions, since they worked in a type of silo, with boundaries and connections that had to be bridged first. By contrast, coordinating the contextually organized units or teams was easier. The question of how the coordination between explorative and exploitative units can successfully influence the implementation of an innovation demands a counter-question for management who have to make the decision about such implementation. Innovations in a contextual ambidextrous context were found to progress rapidly and with much support from the workforce, but might end with innovations different from the ones that the management had in mind. On the other side, in a structural ambidextrous context, structurally separated units had to fight more for the successful

implementation of the innovation. In this case, the innovation can be imposed top-down by management, since the unit or the team is built specifically for that reason. Still the implementation process might be more difficult, since acceptance has to be gained first in the majority of the workforce.



6. CONCLUSIONS AND IMPLICATIONS

6.1. Introduction

The previous chapter, the “Discussion of the results”, outlined all findings systematically in order to finally conclude whether or not certain theoretical propositions can be confirmed or not. First, the findings were compared to current literature and how it substantiates certain findings; second, the findings were linked to the propositions for a comprehensive discussion. Finally, the research objective was considered to answer whether the objective of the research project was achieved or not. This chapter will analyze how the results can contribute to the body of current literature and provide new insights for practitioners.

On the one side, the results obtained in this study can enrich research in the fields of innovation and organizational ambidexterity. On the other side, many of the empirical results are very valuable for the practitioners, especially for the two companies that were part of the case study, since the results can be generalized on this limited scale. The obtained results can help improve the effectiveness and efficiency of both companies in the future implementation of innovations. With this in mind, the findings are summarized in a draft code of practice or ‘cookbook’ taking the form of 16 precise suggestions.

Finally, the last section addresses the shortcomings and limitations of this dissertation and other avenues for research opened up by this study. As in any research project, the choice of focus and perspective implies that another perspectives are not considered. The perspective in this research focused on observing the phenomena of organizational ambidexterity from a point of view of technological innovation. This fact is explained further in the section “Shortcomings/Limitations”. Moreover, lots of new insights have been gained, but these new insights also brought up many new questions that have not been answered yet, but are outlined in the section “Further research opportunities”. This last section is followed by the bibliography that also contains the annotated bibliography from the case studies used to conduct the empirical survey. “Appendices” were added, which include the case study protocols, with analytical and practical interview guidelines and the guidelines for focus groups. The same guidelines were used for both companies.

6.2. Conclusions

As explained in the previous chapter concerning the different theoretical propositions, a set of particular categories has been derived from the empirical survey. Moreover, a cause-and-effect pattern or network was identified from among the different categories relating to each proposition. As a sort of conclusion, the different cause-and-effect mechanisms concerning the individual propositions can be consolidated in a comprehensive cause-and-effect network. This offers a comprehensive understanding of the mechanisms influencing the implementation of technological innovations in HRO environments. The following illustration summarizes the integrated cause-and-effect network:

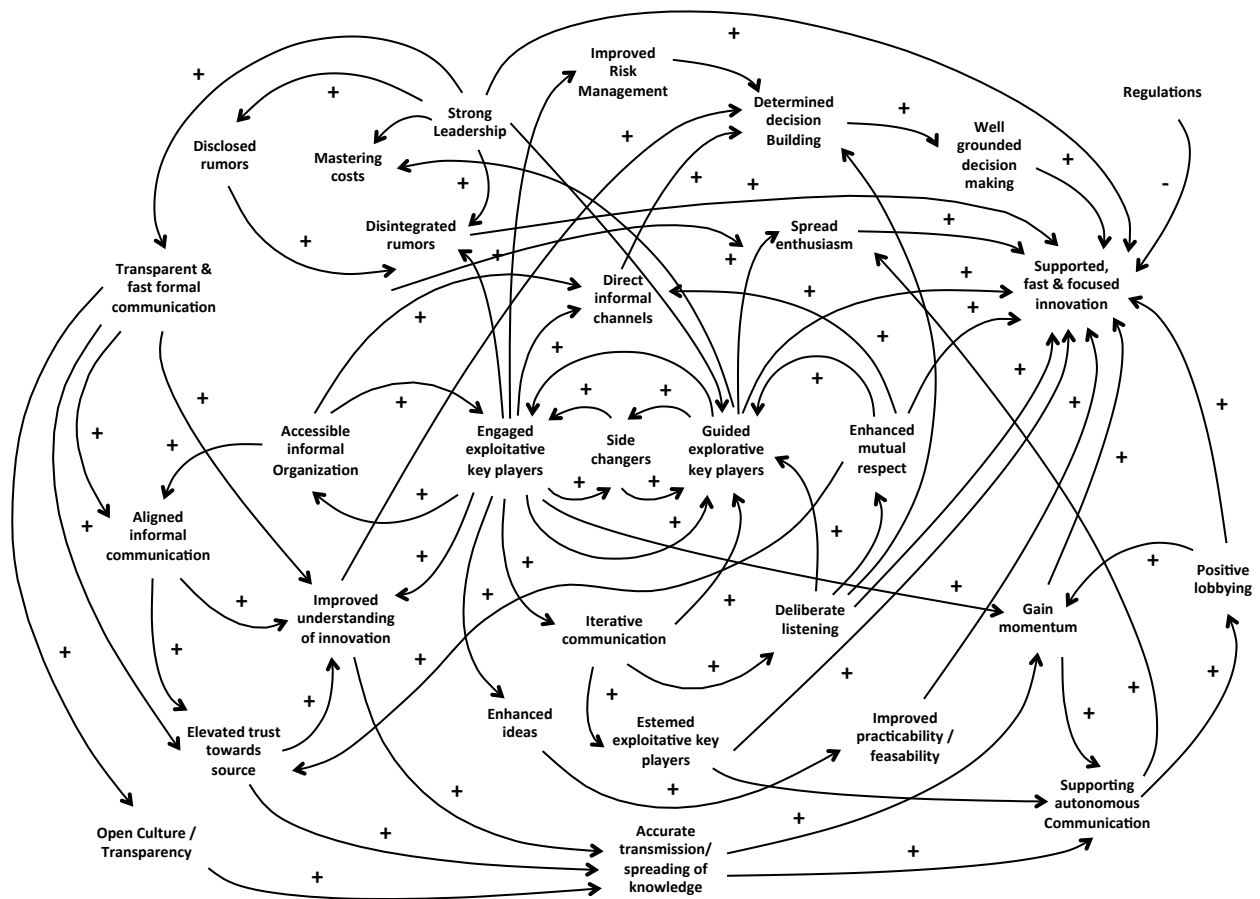


Figure 10: Overall cause-and-effect network

Source: Author.

Considering the findings of this research, other conclusions can be obtained which are explained below:

An important conclusion was that there are key players, categorized and named here as side changers. They are employees who were either exploitative or explorative in attitude and over time changed into explorative or exploitative roles instead. This is presented in the following illustration:

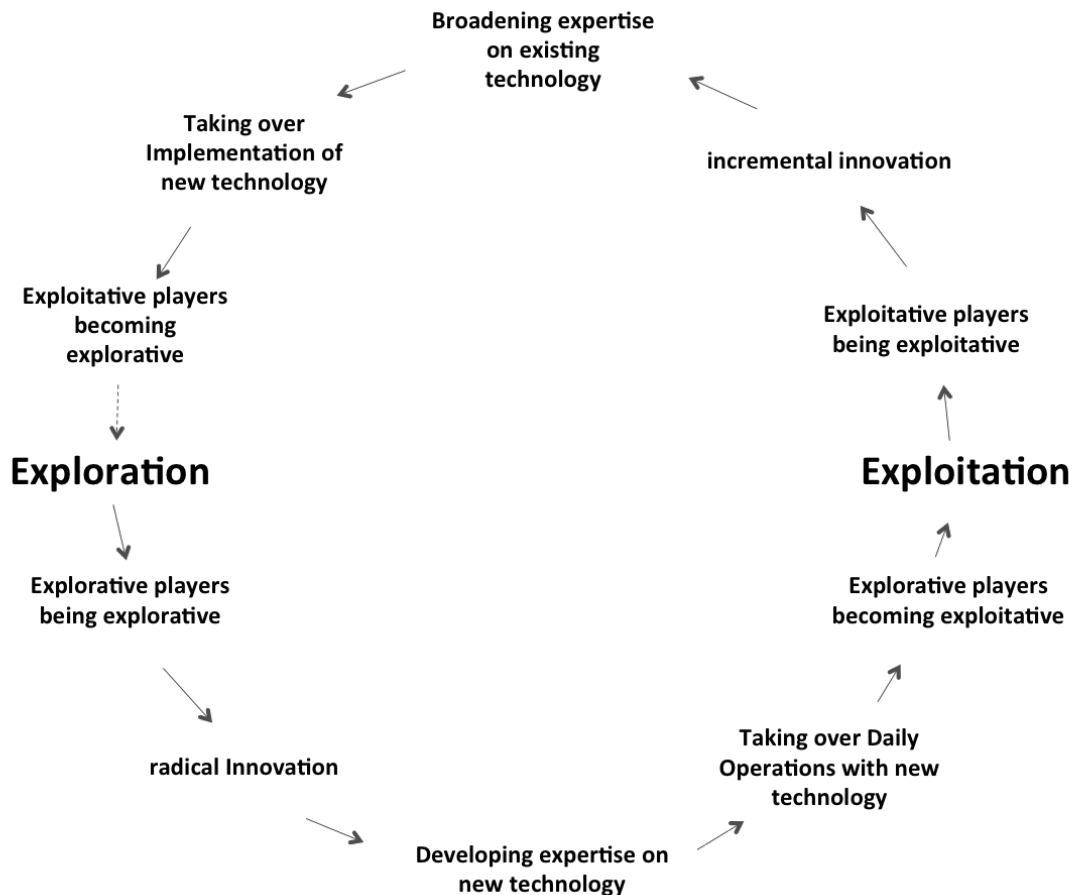


Figure 11: The paradoxical circle of side changers

Source: Author.

Looking at the “exploration” side, it was discovered that “explorative players being explorative” are designated to implement “radical innovation” as part of their job description. Throughout the process of implementing such an innovation and when using the new technology or the innovation over the process of implementation, they are “developing expertise on the new technology”. Logically, such players develop a deep understanding of the technology in

question, become familiar with its strengths and weaknesses, and get to know the informal tricks for using the technology. After innovations are implemented, especially when new technologies are concerned, the people who lead the implementation are often then appointed as the leaders of the team or unit in which the new technology will be used, simply for the fact that they know most about it. These people can then start “taking over daily operation with new technology”, becoming exploiters of the technology. Then “explorative players become exploitative” and are finally part of an exploitative unit, i.e. on the side of “exploitation”.

The opposite process was found as a regular occurrence as well. Usually, leaders active in “exploitation” and, in this sense, “exploitative players being exploitative” apply “incremental innovation” as part of their job description. They let their knowledge and expertise flow into their area of responsibility, incrementally in order to improve existing processes. This can be termed “broadening expertise on existing technology”, making them valuable experts and necessary people for improvements. These players were mostly in leading positions. When new technologies then have to be evaluated and possibly implemented, they could also be designated to handle the relevant project because of their skills and knowledge. They would be “taking over implementation of new technology”. This leads then to the situation that “exploitative players are becoming explorative” through their function and contribute to the “exploration” activity of the company. This paradoxical circle was found to exist at both companies and furthermore widely discussed in the focus groups. Players usually do not change from being exploitative to being explorative in an instant, but do so over a certain time period. There are also players who change sides two or even three times in their career, compared to others who always stay within exploitative or explorative functions. The interesting insight here is that such players bring lots of advantages with them when implementing an innovation, since they are familiar with both sides, exploration and exploitation, and since they know both cultures, worries, and desires and also speak both languages.

Coming to a conclusion with regard to who is supporting and who is hindering innovation processes, and combining this with the categories of exploitative and explorative players, it was discovered that there are two basic levels of willingness and ability to contribute to the implementation of an innovation (see figure below).

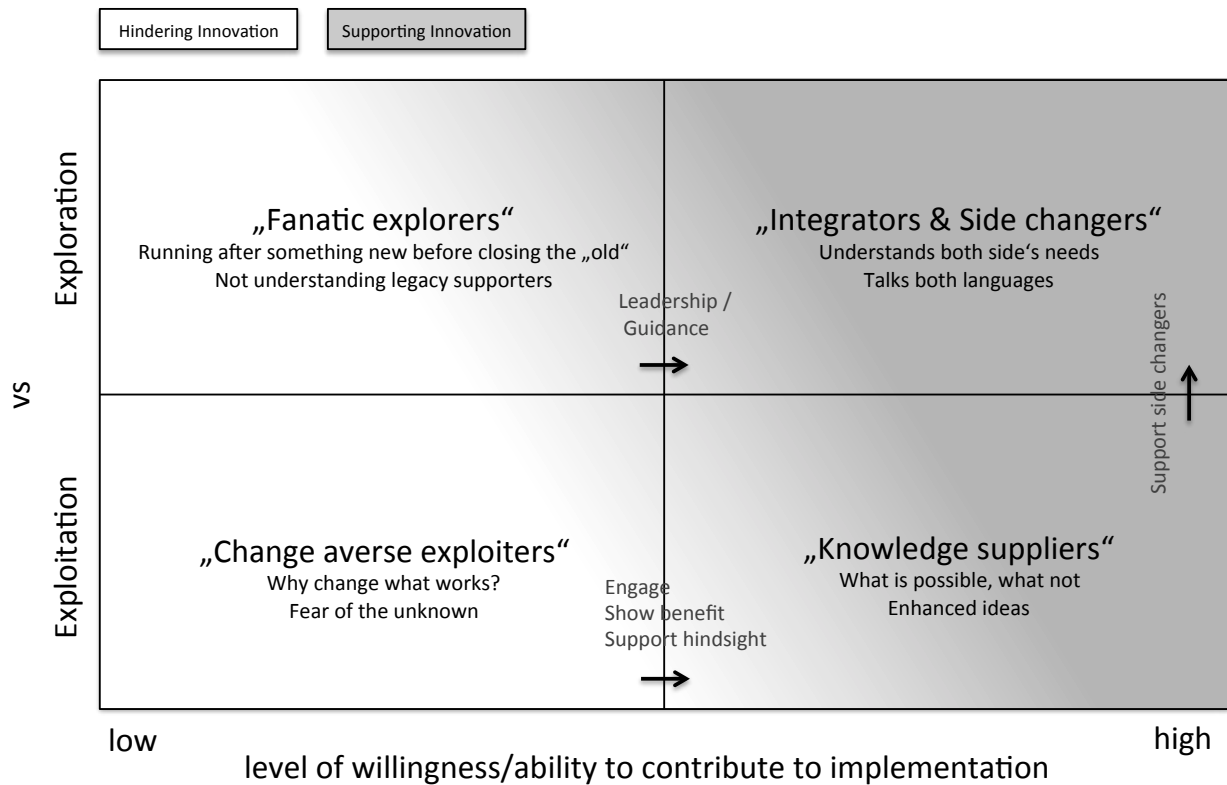


Figure 12: Key players supporting or hindering an innovation

Source: Author.

Having exploitative and explorative players, or exploitation and exploration on the vertical axis, and the level of willingness and the ability to contribute to the implementation of an innovation on the horizontal axis, four quadrants are defined to which the players can be allocated. Exploitative players with low willingness and ability to contribute to an innovation implementation are allocated to the lower left quadrant and defined as change-averse exploiters. These players often counter innovation with questions like “why change what works”, or they are simply afraid of the unknown. Exploiters that show a high level of willingness and ability to contribute to the implementation of innovation, i.e. the players in the lower right quadrant, were often found to contribute to innovations with their knowledge and expertise. That expertise often came in the form of a deep understanding and imagination concerning the risks that could be faced with the innovation or technology, or valuable ideas of how the innovation could be implemented better than assumed. Explorers with low willingness and ability to contribute to an innovation, the players in the upper left quadrant, are called fanatic explorers. This type of player is supportive only towards innovations and new technologies. However, as found in the case studies, there are different reasons for why such players tend to hinder innovations and their

progress. One major reason is that they do not understand the HRO environment, where stability is a must for safe and sound operations. This implies that an innovation must be proven and maybe even fail-safe. In such an environment, there is no space for unknowns and unproven technologies. Therefore, an innovation that is planned for implementation has to be tested in various ways and certain milestones. For instance, a waterfall model or stage-gate-like process has to be followed. Predefined and proven steps are the foundations for further steps, which will be reviewed, tested, and approved again. There is no option to jump from technology to technology and try to implement the fanciest technology every year. Many technologies are used for decades and will remain so in future, due to the complicated and standardized certification processes. A fanatic explorer who would not stick to one technology and implement it, but rather go after the next one, would be in the wrong business in an HRO environment. Another aspect is that fanatic explorers tend to not understand the conditions and the past of the kind of people that seek to work in an HRO business. In an HRO business, there are specific requirements for employees, and they form a somewhat change-resistant workforce both by nature and by having been trained to be change-averse, specifically for their functions. A deeper understanding of this world is necessary for innovation implementation leading players. Players who engage in exploration and show a high willingness and ability to contribute to the implementation of an innovation are called integrators & side changers, simply because they usually are indeed side changers as discussed above, or they have special skills to integrate the exploitative workforce in a way. They accept the innovation or are, at least, not afraid of it or refuse it outright. To mitigate difficulties in the innovation's implementation, the two types of players on the left side could be supported in moving to the right side and become either suppliers of knowledge, which is vital for the implementation of an innovation, or become integrators or maybe even a side changers, i.e. people who have experience in exploitative and explorative functions and usually support innovations. However, as distilled in the focus groups, fanatic explorers need strong guidance and special leadership in order to guide them and tie them to one innovation. Another interesting transition is the move from being supportive to being hindering players, as shown in figure 12 ("Key players supporting or hindering an innovation). Hindering key players are not just vertically separated by the level of willingness to contribute to innovation, but have a tendency to form a trend that goes from the upper left side to the lower right side, like a demand curve. This comes from the finding that exploitative players tend to hinder innovation, whereas explorative players tend to be supportive of it by their nature, but still cannot be presumed to be so without further investigation.

Another important conclusion relates to the observed split between the formal and informal organization and its negative effects on the implementation of innovations. There are informal leaders, as in any organization, and they are not per se associated with problems when implementing an innovation. However, they can become an obstacle when they do not support an innovation, and rather try to counter beliefs going against their assumptions and thereby misinform the workforce. Such actions become a problem when there is a discrepancy between formal and informal communication, that is, when the people in charge of implementing the innovation are informing the workforce about the progress of the implementation, possibly including its successes, while informal communication is undermining that information. As written above in the section “Discussion of the results”, there are several countermeasures to avoid or solve such situations; however, it can be very harmful for the innovation’s implementation when formal and informal information are not congruent. It was also observed that the bigger such discrepancy, the worse it is for the company that aims to implement an innovation or a new technology, because the workforce becomes insecure and can begin to mistrust official communication.

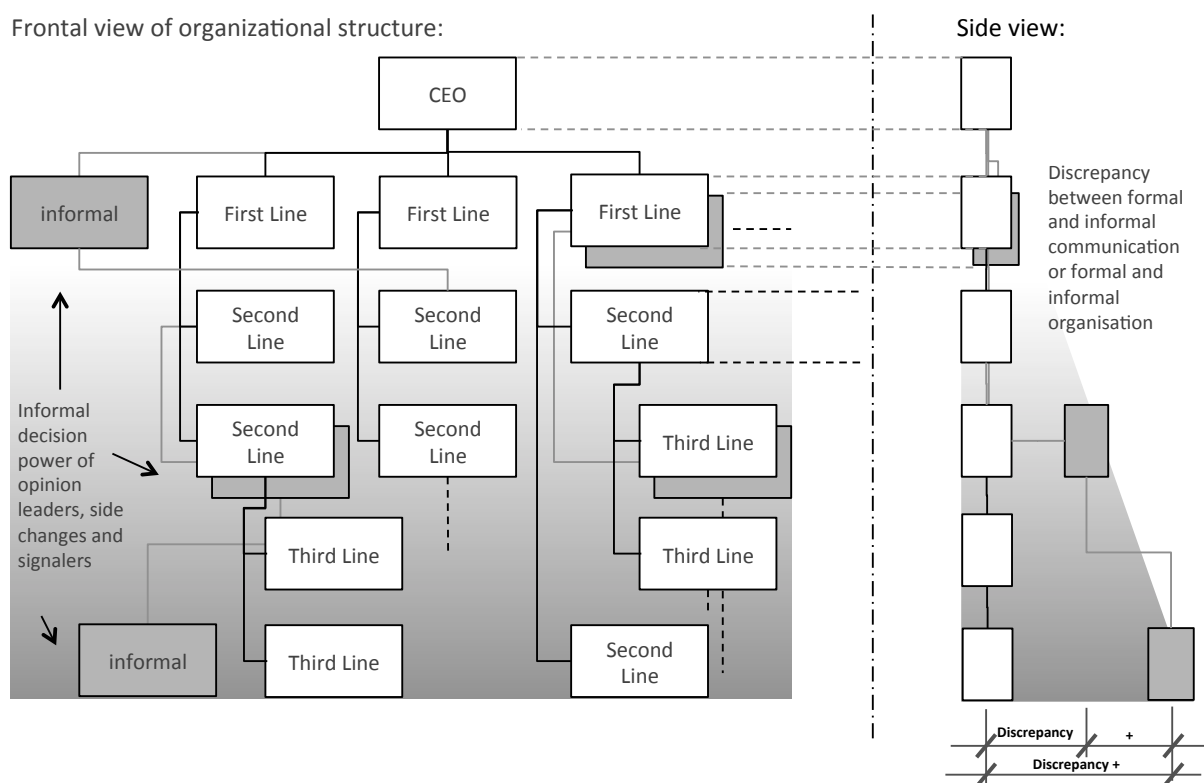


Figure 13: Formal and informal organization

Source: Author.

Another obviously interesting aspect concerns how informal leaders can be used for the vested interest of the formal organization. The insights from this study can add to the current debate of how informal organizations can be integrated and influenced for the good of the company’s objectives. Actors in the informal organization can be opinion leaders, known side changers or even signalers. These players can be act as a kind of amplifier, either exacerbating negative news/information or promoting a fast and focused implementation of the innovation.

Combining the different players and their influence with the different hierarchical levels of the organization, the following hierarchical level/influence matrix can be drawn:

Hierarchical level	high	„Formal leaders“	„Informal and formal leaders“
	low	„Average employee “	„Informal leaders“
		low	high

Influence on opinions

Figure 14: Hierarchical level/Influence matrix

Source: Author.

The vertical axis shows the hierarchical level, from lower to higher echelons of the organization. On the horizontal axis, there is the influence on opinions the key players have, increasing along the axis. Players who are at a high or higher hierarchical level than others, in the upper left quadrant, are called “formal leaders”. Players at a lower or the lowest hierarchical level, in the lower left quadrant, can be regarded the “average employees”. Players who are at the lowest

hierarchical level or at a lower level than others, but who still have a lot of influence on the opinions of other people because of their expertise, their knowledge, or any other reason, are called “informal leaders”. Such informal leaders, compared to the formal leaders, have influence in the informal organization and are also more visible there. Players that are at higher hierarchical levels and are informal leaders at the same time can be called “informal and formal leaders”. They seem predestined for leading innovation projects at least or sponsoring them, based on their double influence, which can help penetrate the informal organization. Often, such players are represented by the side changers that were discussed above.

All of the different players and their support for or potential harmful effect on innovation can be represented on a curve aligned with their exploitative or explorative function, which is defined by the vertical axis, while the effective support or harm to innovation is visualized in the horizontal axis:

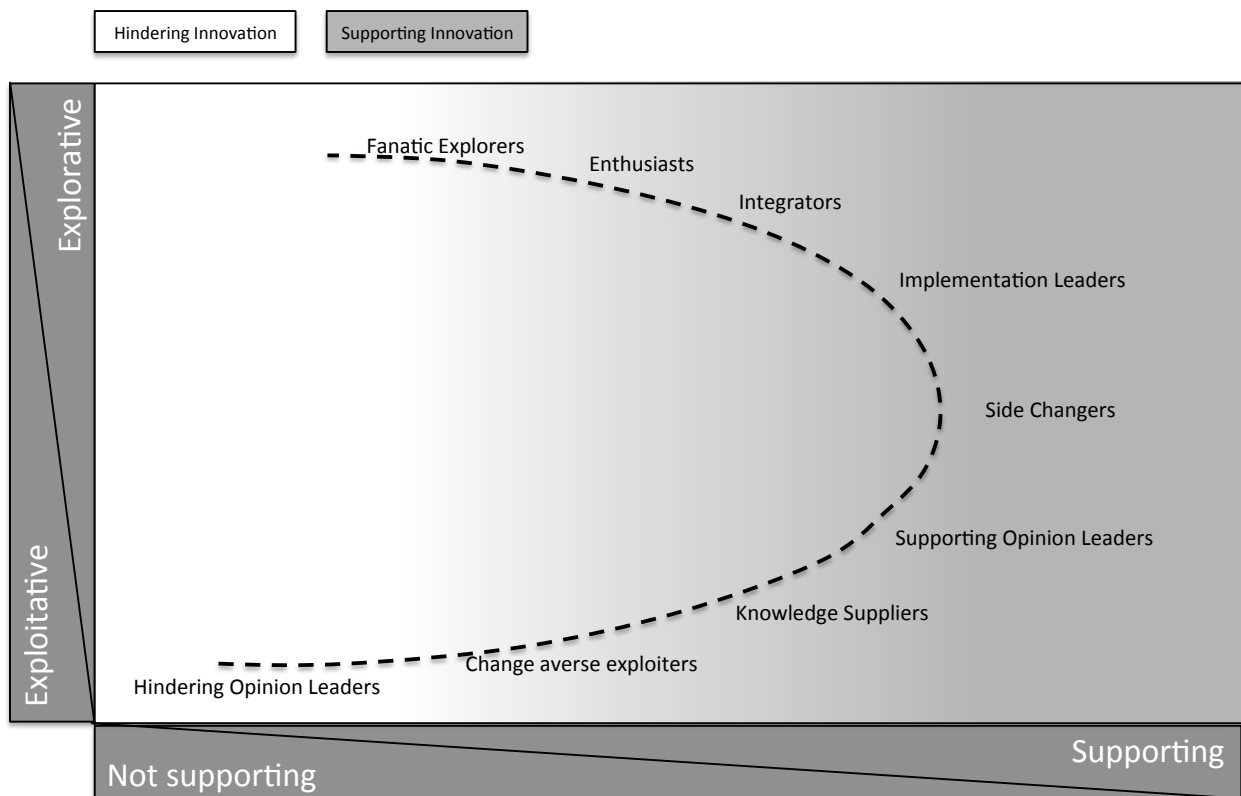


Figure 15: Player supportivity curve

Source: Author.

Exploitative players who are not supporting an innovation can, in a first instance, be considered hindering opinion leaders. These players, who are by their nature exploitative players, are usually not in favor of innovation, but against it. When they use their influence, these players can severely harm the progress of an innovation project. Next to them, albeit with less negative impact, are change-averse exploiters, who are similar in many respects, but are not opinion leaders and not as influential. The first exploitative players who would support an innovation are the knowledge suppliers, the ones that deliver expertise and required knowledge and help to implement an innovation accordingly. As supportive or even more supportive are supportive exploitative opinion leaders, who become attuned to an innovation, spread enthusiasm and give credit to the project and influence others as a result. Known side changers are equally supportive, located at the vertex of the curve, where the side changes from the exploitative to the explorative players on the vertical axis. Very supportive explorational players are, of course, the implementation leaders who assume lots of responsibility and emphasize the potential that comes with an innovation. The so-called integrators are equally supportive, i.e. players who integrate and engage with exploitative people. Supportive, but not as influential or as integrative, are the enthusiastic explorative players, who talk positively about an innovation and can infect others with their way of thinking. However, although spreading enthusiasm alone might be supportive, it should not be considered decisive in the end. Not supporting or giving any credit in an innovation implementation project are the fanatic explorers, even though they could also be enthusiastic about an innovation. The resulting curve with the different players supporting and hindering an innovation is not complete in terms of the many possible types, but it visualizes the specific types that were found to exist in this dissertation.

On the other hand, an interesting framework was proposed by Lavie et al. (2010), which explained the paradoxical association between exploration and exploitation. They stated that exploitation and exploration essentially do not mesh with each other because of the different goals and cultures. They also explained that exploitation is positively associated with income, which is again positively associated with exploration, since income finances future exploration. Exploration is considered positively associated with creating opportunities, which is again positively associated with further exploitation in the future. However, the framework concludes that exploitation and exploration are not positively associated with each other, even though both are dependent on each other. This framework by Lavie et al. (2010) was adapted and amended with the inclusion of the exploitative and explorative players and the effects they can have on

incremental and radical innovation, based on the findings obtained in this research. The following figure shows the adapted and amended framework:

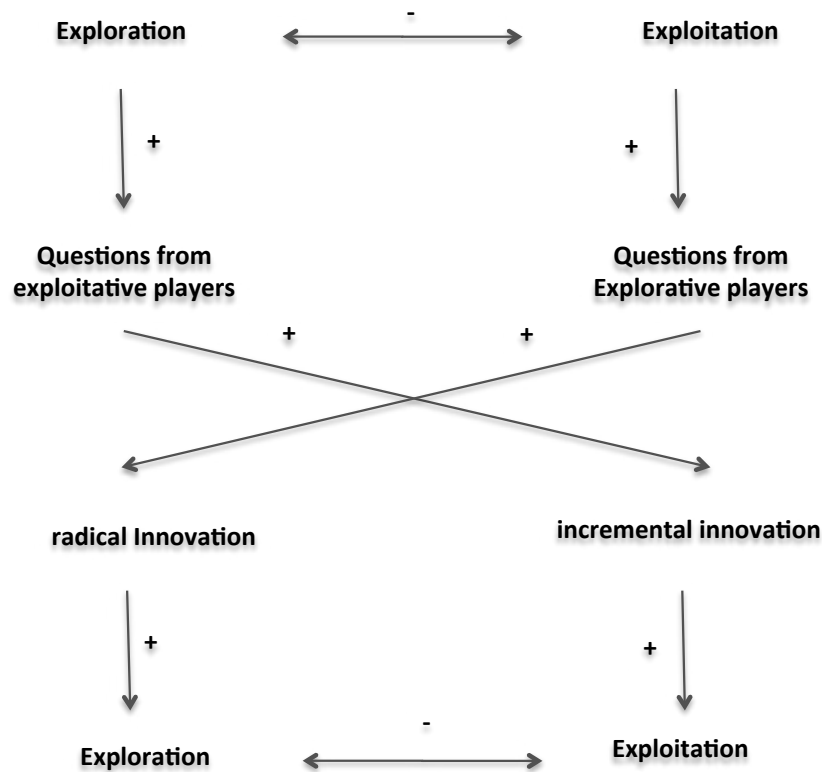


Figure 16: Paradoxical associations between exploration/exploitation and radical/incremental innovation

Source: Adapted from Lavie, D., Stettner, U., & Tushman, M. L., (2010).

According to the findings made here, it is evident that exploration is positively associated with radical innovation and, furthermore, that radical innovation is positively associated with the questions that explorative players ask exploitative players. It is the same on the other side, as exploitation is positively associated with incremental innovation, and incremental innovation itself was found to be positively associated with the questions that exploitative players ask explorative players, even though this direction is less common. In the adapted figure above, the original cause-effect diagram by Lavie et al. (2010) was amended to include the communication between exploitational and explorational players and its effect on incremental and radical innovation.

Finally, another interesting conclusion of this research relates to the informal persuasion practices that were being used and applied in the cases studies. Faced with the structural ambidexterity in case study one, the management mainly had to convince the workforce that the innovation was the right thing to do; in the contextually ambidextrous case study two, the innovation implementation team had to convince their management that the promoted and suggested idea was the right thing to do. Daft (1978) also confirmed the findings regarding structural differentiation, in the sense that the workforce does not appreciate technical innovations that are being imposed by higher administrative management. In the second case study, the innovation implementation team had to convince the exploitative workforce, but this never seemed to be their major problem. Rather, the challenge for them was to convince their management. This conclusion shows that depending on the organizational set up, the innovation implementation team has to either fight the workforce or the management.

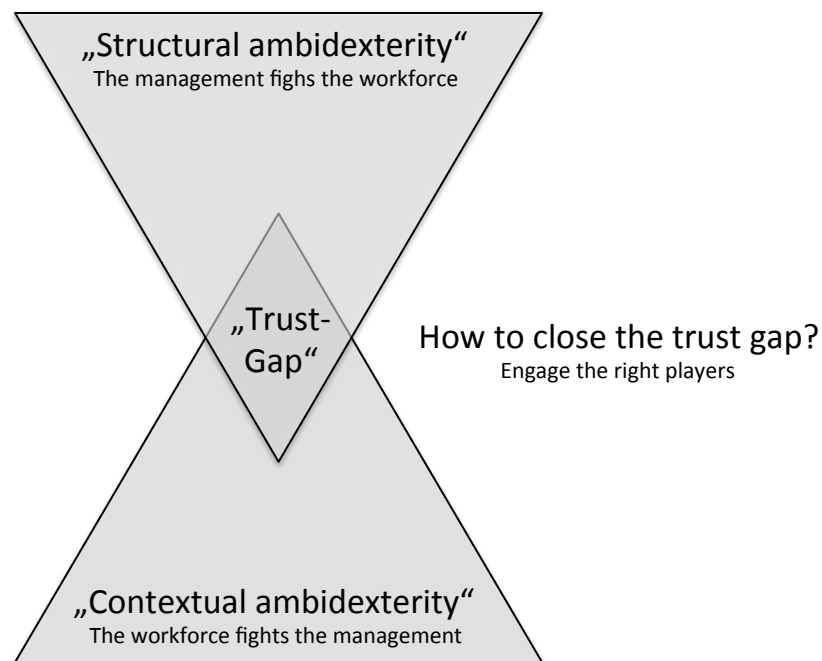


Figure 17: Trust-gap: Top-down versus bottom-up view

Source: Author.

Related to this conclusion, it can also be concluded that a trust gap exists when implementing an innovation, no matter what form of organizational set-up is chosen. This gap can be closed by choosing the right key players, such as side changers or integrators.

6.3. Practical Implications

There were several general findings that have direct implications for practitioners, which are summarized in this section as a set of suggestions for all innovation implementing leaders and organizations within an HRO environment. This advice is based on the gained insights, findings, and conclusions of this dissertation.

1. To involve exploitative key players in innovation projects from the beginning, as they can open the doors to the skeptical informal organization.
2. To support an iterative interaction process between explorative and exploitative players, in which exploitative and explorative key players improve their understanding of an innovation also learn to improve its application.
3. To support cross-divisional/departmental and cross-hierarchical informal interactions in order to improve mutual respect and trust throughout the company.
4. Explorative key players should be guided by accountable exploitative players regarding the deliverability/feasibility of the innovation.
5. Fanatic explorers need to be led/guided closely by the management.
6. Support from change-averse exploiters should be promoted through participation and reasoning.
7. To have a strong, predictable, and well-respected leader leading the innovation's implementation, if possible an internal side changer.
8. To attempt to constantly align informal and formal communication.
9. To spread knowledge about an innovation formally throughout the organization and back it up with all types of informal communication.

10. To develop an open culture in which criticism is welcome and regarded as straightforward feedback.
11. To listen to what is being said and what people's needs are, and respond with practical actions and results.
12. To explain why innovation is necessary and what the benefits are for everyone. If the staff is convinced, acceptance among regulatory is easily gained.
13. To cultivate determined leadership, making tough decisions, but explaining why they have been made.
14. Having defined the opinion leaders, to captivate and engage them personally, listen deliberately to them, and give them appreciation.
15. To arrange informal gatherings where enthusiasm can be spread and questions answered in the most informal manner possible.
16. To overcome conflicting rumors and make them transparent, public, and therefore useless. To communicate how things really are.

Considering the network of cause-and-effect relationships described in the previous chapter, the figure below shows the particular relationships that could be influenced by adopting the recommended measures. The effects, in particular the categories written out without being underlined, are those that can be influenced most easily with the 16 suggested measures written above. The effects illustrated as underlined categories, such as “supporting autonomous communication”, cannot be achieved directly, but are recommended to be addressed indirectly through a bundle of actions (not underlined categories):

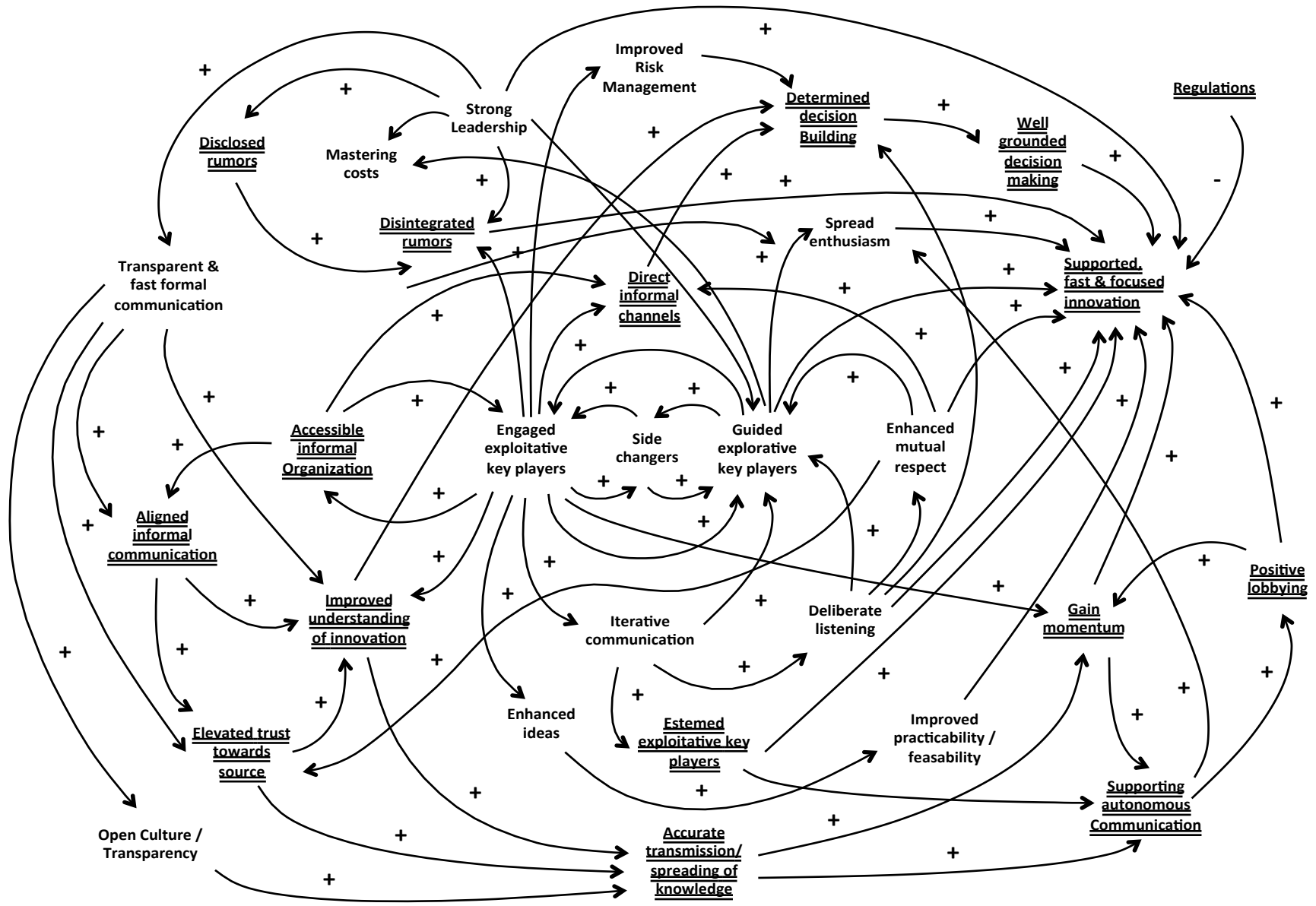


Figure 18: Causes and effects that can be influenced

Source: Author.

6.4. Further research opportunities

The findings outlined here point to other avenues that could be explored with more research. Regarding the role of key players, there is currently a wide gap between the study of personal and individual contributions and the research into the ambidextrous capabilities of firms. As investigated in this study, individual players can have decisive influence on successful ambidexterity or indeed the contrary, i.e. hindering the development of ambidextrous capabilities. However, the study of the effect and the roles that individual players have on ambidexterity has so far been limited. Informal players and their influence have been undeservedly neglected. Therefore, further studies on the role of key players, and especially informal players, and their influence on ambidexterity are needed.

Another interesting aspect is the distribution of knowledge through close and intensive social relations. Leadership that enables participation and engagement in natural networks or indeed fosters networks, promotes the sharing of knowledge, which in turn supports ambidexterity. There could be more studies which analyze the personal networks and social structures that enable the distribution of knowledge within organizations, as originally stated by Hansen (1999).

Another aspect that appeared to have an influence on successful ambidexterity is trust. More studies are needed to confirm the evidence gained here in other kinds of organizations and industries, in which ambidextrous organizational forms are also being used. As previously explained, radical innovations are rare in HRO industries. More studies are needed in other type of industries in order to develop the theory further.

When considering the interaction between exploitative and explorative players, the more intense, the more experimental activities apparently became (Henderson & Clark, 1990). However, what the impact of experimentation is and how much it influences the individuals in an ambiguous setting remains unclear. More studies in this area would clarify its influence and impact.

Another interesting aspect concerns the transformation of innovation implementation teams, especially in the context of structural ambidexterity. In the case of innovation projects

started in external or structurally separate units, the people involved in these units became, after a period of two to three years, exploitative players or side changers. More longitudinal studies could investigate how structurally separated units evolve and how their players change and finally contribute to the successful implementation of innovations. It would also be interesting to get an insight into how the engagement of the exploitative workforce in the implementation evolves over time. There is also potential for further investigation into how the different ambidextrous solutions affect the commitment of the workforce.

Theoretical proposition 2 was not fully confirmed, but it indicated a keen level of interest among the exploitative workforce in explorative activities, even though it is never as substantial and penetrative as in the opposite direction. More studies focused on how an exploitative workforce approaches and absorbs or even undermines innovation in its initiation stage would offer broader insights into how an exploitative workforce behaves and reacts when in contact with explorative players leading radical innovation.

This study gave some insight into the mechanisms of innovation in ambidextrous organizations in an HRO business environment, but businesses associated with the aviation sector only were part of this research project. However, there are more HRO business areas, such as emergency services etc. to which this study could be extended to confirm the findings obtained in this specific industry.

In structurally ambidextrous organizations, integration mechanisms become important, e.g. concerning how innovation can be integrated into the part of the workforce that will use it later. However, in the case of contextual ambidexterity, it seems that integration mechanisms would not be needed so much (explained in section 6.2). It would be very valuable to gather more knowledge about the integration mechanisms and how they work.

Related to structural ambidexterity are boundary activities, namely on the formal boundaries (Lawrence & Lorsch, 1967) and informal boundaries (Jansen et al., 2006; Tsai & Ghoshal, 2007). While the process of knowledge transfer across formal boundaries is widely known with regard to organizational ambidexterity, there is still only limited knowhow about how informal boundaries contribute to knowledge transfer in ambidextrous organizations. In general and as suggested by Rosenkranz (2012), it is not only about boundary activities, but also about boundary spanning, an aspect that is under researched and needs more attention.

6.5. Shortcomings/Limitations

The research carried out here has several limitations which need to be addressed:

According to Gopalakrishnan and Damanpour (1997), an innovation's progress can be broken down into a sequence of initiation, implementation, and diffusion. This study only focused on the initiation and implementation phases, with most of the study was aimed at the implementation stage. The stage of diffusion was not intentionally part of the study, even though theoretical propositions 1 and 2 were related to that stage, as the internal diffusion inside the company can be regarded a form of diffusion as well. In this sense, diffusion was part of this study, even though it did not specifically focus on extra-organizational diffusion. What was not considered at all was the extra-organizational diffusion of innovation in either case study.

Regarding the level of analysis, the organizational and subunit levels were treated separately in this dissertation, whereas the industry or environmental level (Crossan & Apaydin, 2010) was only considered in terms of the cultural setting in which HROs operate. It was, however, not evaluated or analyzed any further. In addition to other environmental factors, the competitive environment was also excluded from this analysis, even though competition does contribute to the implementation of innovations, as mentioned in some rare moments by the interview partners.

When considering the form of innovation (Gopalakrishnan & Damanpour, 1997), the main focus was on the innovation process itself and how it can be designed effectively and efficiently, while the output of the innovation was only regarded as a by-product. In both case studies the offered service remained the same, even though it was delivered differently to the customer. Further reason to focus on the process, rather than on the output itself, was the environment in which this case study took place. Product innovation is tremendously important in fast moving markets (Capon et al., 1992), which is not an urgent criterion in the HRO sector. In the case of Swiss, the service is still in essence the provision of transport from A to B, even if this happens in a new aircraft with a newly organized interior and with new and more efficient processes. In the skyguide case, the service was still plain air traffic control service, even if it is provided virtually and literally from an independent location, once the implementation is complete.

Regarding the type of innovation, distinguishing between administrative and technical innovations, this study focused mainly on technological innovation.

As stated in the chapter 2 (“Literature review and theoretical propositions”), one can distinguish between generating or adapting innovation. This research focused mainly on generating innovation, as both studied companies were generating innovations, namely process innovations in the delivery of their services. It is worthwhile to mention that the border between creating and adapting an innovation is fluid, especially when new technologies can be put together in a new way to offer an innovative process that delivers the same service more effectively.

Another limitation of the study relates to the different organizational setups of both case studies. They were focused on two different organizational ambidextrous solutions, namely structural and contextual. However, the theory chapter mentioned a third solution, i.e. leadership ambidexterity which was not considered nor specified in this study.

The players that were considered in this dissertation are mainly allocated to the subunit and organizational levels. Players on the industry level were generally not considered. As a result, little is known about the external players, and further investigation might be required.

Another limitation is the established simple classification and distinction between exploitative and explorative players or roles. Most studies show that players and persons are either explorative or exploitative. In this study, it was found out that barely a single player could be classified as either one or the other. The vast majority of the players could all be considered both to some extent. The question was rather to which extent a player was either exploitative or explorative, while almost every single person had both properties personalized, albeit with a more or less clear tendency to one pole.

A final limitation is related to the size of the companies analyzed. Both participating companies have more than 2000 but fewer than 10000 employees. This study cannot answer how smaller or bigger companies behave and what the conclusions would be in those cases (Cohen & Levinthal, 1990)



7. REFERENCES



7.1. Bibliographical references

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8. APPENDICES



8.1. Analytical Interview Manual

Prop. Fam.	Question
A	Is the know-how of exploitative players a lot of times consulted by explorative units when it comes to decisions regarding radical innovations?
A	What measures/actions do you do before deciding to invest into a radical innovation?
A	What measures/actions would you do if you were in an explorative unit or did you do when you were in a explorative unit in regard to make the right decision about a radical innovation?
A	Who do you contact in order to discuss newly to purchase radical technology within the company?
A	By whom are you being contacted from when someone acquired a new radical technology and asked for advice or inputs?
A	About what do you talk usually when meeting a colleague who has knowledge about certain processes of the appliance of an existing technology?
A	Do you get advice from exploitative player roles that have experience with the old technology when having to make a decision about incremental innovation?
A	Are you being asked for advice from explorative players when they have to decide whether to buy or not a radical innovation?
B	Is the know-how of explorative players sometimes consulted by exploitative units when it comes to decisions regarding incremental innovations?
B	What measures/actions do you do before deciding to invest into a radical innovation?
B	What measures/actions would you do if you were in an exploitative unit or did you do when you were in an exploitative unit in regard to make the right decision about an incremental innovation?
B	Who do you contact in order to discuss newly to purchased radical technology within the company?
B	By whom are you being contacted from when someone acquired a new radical technology and asked for advice or inputs?

Prop. Fam.	Question
B	Do you get advice from explorative player roles who have experience with the new radical technology or a similar one when having to make a decision about radical innovation?
B	Are you being asked for advice from exploitative players when they have to decide whether to buy or not an incremental innovation?
C	Are there some key players roles or persons that support the integration of explorative units?
C	Are there some key players roles or persons that mitigate the integration of explorative units?
C	What key players roles would support the integration of explorative units?
C	What key players roles would mitigate the integration of explorative units?
C	Who besides the senior management supports the integration of explorative unit through daily common actions?
C	Who could support the integration of an explorative unit?
D	Do the interactions between different key players roles in explorative and exploitative units have positive spillover effects in regard to the implementation of technological innovation?
D	What effect do the interactions between different key players roles in explorative and exploitative units have in regard to the implementation of technological innovation?
D	Are there positive spillover effects because of the interactions between explorative and exploitative players in regard to technological innovation?
D	What does support the implementation of technological innovation in regard to interhuman activities?
E	Do key player roles support the integration of explorative units through informal information exchange between themselves?
E	How do you think do key player roles support the integration of explorative units through informal information exchange between themselves?
E	Does informal exchange of key player roles support the integration of explorative units?

Prop. Fam.	Question
E	How much informal exchange between key player roles is important for the company?
E	How does the contact key players in explorative and exploitative units have support the latter reintegration of themselves?

Table 64: Analytical interview manual

Source: Author

8.2. Practical Interview Manual

Each interview will begin with an introduction where the following will be discussed and explained:

No cell phone shall be left on during the interview in order to “dive” into the topic without being interrupted

The goal of the interview is explained and if necessary discussed

Information that all data will be handled according the NDA (Non Disclosure Agreement).

Legend:

“I”	=	Questions posed only to explorative unit key players / roles
“i”	=	Questions posed only to exploitative unit key players / roles
“cogn”	=	Cognitive questions
“ladd”	=	ladder questions
“crea”	=	creative questions
“proj”	=	projective questions

No.	Question	Prop. Fam.	Ad. Info	Tech-nique	Possible answer
Personal Questions					
1	Can you tell me about your position/function in your current unit/Company?	-	warm-up / Longitud. relevance	cogn	Open answer
2	For how long are you in this function?	1, 2	warm-up	cogn	Open answer
3	How does your daily work look like?	3, 4, 5	warm-up	cogn	Open answer
4	What function did you have before that and in what company?	1, 2, 3, 4, 5	warm-up / Longitud. relevance	cogn	Open answer
II. UNIT: Virtual Centre Model (Comprehension / Explorative Unit)					
5-r	Can you tell me a little bit more about the new explorative activity? Characteristics Duration Persons involved Technology Financing Status	1, 3, 4, 5	Longitud. relevance	cogn	Open answer

No.	Question	Prop. Fam.	Ad. Info	Technique	Possible answer
5-i	Can you tell me a little bit more about the operative unit or team you are working in? Characteristics Duration Persons involved Technology Financing Status	2, 3, 4, 5	Longitud. relevance	cogn	Open answer
6-r	What is your role in that new explorative activity?	1, 3, 4, 5	Longitud. relevance	cogn	The person is somehow in a position with certain responsibility and power to guide the unit and make impactful decisions
7-i	What is your role in the operative unit or team?	2, 3, 4, 5		cogn	The person is somehow in a position with certain responsibility and power to guide the unit and make impactful decisions

No.	Question	Prop. Fam.	Ad. Info	Technique	Possible answer
8	<p>What are other organizational key players you are working with?</p> <p>Name and allocate them</p> <p>How are decisions being taken?</p> <p>How are the interactions in general?</p> <p>What is the content/issue/topic?</p> <p>How do you communicate?</p> <p>Where do you communicate?</p> <p>How often do you communicate with them?</p> <p>What functions did they have before this assignment?</p>	1,2,3	<p>Illustrate organizational key players with map: (the farer away)</p> <p>The bigger, the higher in hierarchy,</p> <p>The bolder, the more influence,</p> <p>The more grey the longer in the company /</p> <p>Longitud.</p> <p>Relevance</p>	cogn	<p>Key players they work with are as well in positions with certain responsibilities and power.</p> <p>They work within the same team or lead teams in different departments within skyguide.</p> <p>Decisions are being taken after they have talked to each other and made up their mind in a informal way.</p> <p>Interactions are formal but as well informal while at lunch, doing sport etc.</p> <p>They were as well in responsible positions, either in an exploitative or explorative unit.</p>

No.	Question	Prop. Fam.	Ad. Info	Technique	Possible answer
Role (key player roles)					
9	What kind of key players are supporting the integration of this explorative activities and its results into the company? (Work with post-its)	3, 5		cogn	Key players of every sort within the company, but mainly some with certain specific knowledge, which others want to fetch are supporting the integration of a new unit.
10	What kind of key players do mitigate the integration of the new explorative activities or its results into the company? (Work with post-its)	3, 5		cogn	Open answer
Sub-Chapter of Role: Decisions					
11	How do you inform yourself about new technological developments?	1, 2, 3		ladd	Through formal and informal interactions with other key players or with phone call, Emails etc.
12-r	What do you do before deciding to invest into an innovative technology within such explorative activities and in general?	1, 2, 3, 4	and why do you benefit from doing that... to what purpose did you do that...	ladd	They talk to key players who have certain knowledge in the specific area, even though their knowledge it not exactly about the innovative technology (because it is new and rarely known) but familiar with the specificities.

No.	Question	Prop. Fam.	Ad. Info	Technique	Possible answer
12-i	What do you do before deciding to invest into an innovative technology?	1, 2, 3, 4	and why do you benefit from doing that... to what purpose did you do that...	ladd	They talk to key players who have certain knowledge in the specific area, even though their knowledge it not exactly about the innovative technology (because it is new and rarely known) but familiar with the specificities.
13	Who did you ask for advice in order to make the right decisions about an innovative technology and why?	1, 2, 3, 4		cogn	key players who are familiar with the specificities of the specific knowledge or knowledgeable about the forefather technology which accounted for results before the new technology.
14-i	What kind of advice do you get from key players that have experience with the appliance of the new technology?	1, 2		cogn	Advice how this new technology could be implemented within the exploitative unit as a matter of production factor or efficiency gain.

No.	Question	Prop. Fam.	Ad. Info	Technique	Possible answer
14-r	What kind of advice do you get from key players that have experience with the appliance of the old technology?	3		cogn	Advice what is possible with the old technology and what the results on outcomes were with it. They also can help understand what the new technology is able to deliver in regard to output quality of the new technology. They are also aware of critical chains within the old technology which a lot of times also apply to the new technology. So to say, they now where “to put the finger on”.
15	How helpful is the advice you get?	1, 2, 3		ladd	Really helpful since they are the peers with the technology. It is especially helpful because they are so familiar with the inhouse processes and the appliance of the former technology. They know what the input is and they know what the output of the technology should be. With certain understanding or imagination, they will be able to make of what the new technology is able to and to what not.

No.	Question	Prop. Fam.	Ad. Info	Tech-nique	Possible answer
Interaction (Boundary activities)					
15-i	By whom are you being contacted from, when someone acquires an innovative technology and asked for advice or inputs?	1		proj	By roles from the explorative unit
15-r	By whom are you being contacted from, when someone acquires an innovative technology and asked for advice or inputs?	2		proj	By roles from the exploitative units
16-r	When are you being asked for advice from key players from people involved in exploitative activities when they have to decide whether to invest into an innovative technology or not?	1	Only ask if not suitable answered by question 15	proj	Ahead of a decision to make
16-i	When are you being asked for advice from key players from people involved in the new explorative activities when they have to decide whether to invest into an innovative technology or not?	2	Only ask if not suitable answered by question 15	proj	Ahead of a decision to make

No.	Question	Prop. Fam.	Ad. Info	Tech-nique	Possible answer
17-r	About what are you being asked for advice from key players from people involved in exploitative activities when they have to decide whether to invest or not an innovative technology?	1	Only ask if not suitable answered by question 15	proj	About specific knowledge and insight into the to be acquired technology. About the own experience with the appliance of the old technology or any experience with the new technology.
17-i	About what are you being asked for advice from key players involved in explorative activities when they have to decide whether to invest or not into an innovative technology?	1	Only ask if not suitable answered by question 15	proj	About specific knowledge and insight into the to be acquired technology. About the own experience with the appliance of the old technology or any experience with the new technology.
18	How does such communication take place?	2	and where?	cogn	During normal business days, on the phone within meetings, on unofficial events such like having lunch together, doing sports or sharing spare time together.
Subchapter of Interaction: Implementation of new technology					
19	How does your company handle the implementation of innovative technology?	3, 4, 5		cogn/la dd	They analyze the market opportunities, make up their mind with the inputs of knowledge players and decide between choices. Once bought, it is integrated into daily business as soon a convenient.

No.	Question	Prop. Fam.	Ad. Info	Technique	Possible answer
20	How often do you interact with other units when it comes to the implementation of innovative technologies?	1, 2		cogn	They talk about innovations and the “newest” movements in the market regularly. In regard to implementations, we share information on a regular basis in order to inform the other units about new capabilities.
21	What does support the implementation of technological innovation in regard to interhuman activities?	1, 2		cogn/la dd	The fact that we talk to each other regularly, as well outside business hours, on unofficial events and gatherings.
22	What are the benefit of interacting with other units in regard to the implementation of innovative technology?	1, 2		cogn	The benefits are that all involved employees are informed about the new capabilities.
23	What hindering factors did you experience when interacting with other units during the implementation of innovative technologies?	3		cogn	None, maybe that they were not supporting the implementation through information exchange

No.	Question	Prop. Fam.	Ad. Info	Technique	Possible answer
24	What are spillover effects resulting from the interaction (positive/negative/none)?	4, 5		cogn	Spillover effects are that we were forced to work close together through information exchange. So we ended up having a better understanding of the technology and of the others handling with the innovation. We connected and finally became more familiar with each other.
Organization					
25	How are the outcomes of explorative activities, being transferred into daily business?	-		proj	Through a new business, a new technology, a new market, a development of a new product, a project.
26	How does a project, focused on exploration, integrate into daily business?	1, 2, 3, 4, 5		proj	The process: Information about a change - Building of the new unit with the according personnel – Exchange of information through integration of it – Acceptance by the other units – Performance together.

No.	Question	Prop. Fam.	Ad. Info	Tech- nique	Possible answer
27	How does a project focused on exploration terminate?	-		proj	Through the integration into the rest of the company as a independent unit or through the overtake from an existing unit or through the official statement that the project phase has terminated and that it is going over into daily business.
28	How does the initiation of an explorative activity in particular happen?	1, 2		cogn	Through de decision of senior management at a specific time in the life cycle of the yet to be founded unit.
29	How does the organizational reintegration of an such explorative activity in particular happen?	3, 4, 5		cogn	Through the decision of senior management at a specific time in the life cycle of the existing unit.
30	In general, what does support the integration of explorative activity teams into daily business?	3	Name factors with the help of post-it's (Illustrate)	proj	The active management through senior managers, the formal interaction between the units and the informal interaction between roles of explorative and exploitative units.
31	In general, what does mitigate the integration of explorative activity teams into daily business?	3	factors with the help of post-it's (Illustrate)	proj	Non-cooperative interactions between roles within the units (hidden agendas).

No.	Question	Prop. Fam.	Ad. Info	Technique	Possible answer
32	In particular, which key player actions support the integration of explorative activity teams into daily business?	4, 5		ladd	Formal gatherings and discussions. Official integrations mechanisms. The information of each other's issues (formal and informal).
33	In particular, which key player actions mitigate the integration of explorative activity teams into daily business?	3, 4, 5		ladd	Absenteeism and not passing relevant information.
34	How do acquainted key players in explorative activity teams facilitate the reintegration of the explorative activity team members into the organization?	2, 3, 4, 5		cogn	Through having a long and trustful relationship with other roles in the exploitative units which support the integration. Through acceptance of themselves.
35	How do acquainted key players in daily business facilitate the reintegration of the explorative activity team members into the organization?	1, 3, 4, 5		cogn	Through having a long and trustful relationship with other roles in the explorative units which support the integration. Through acceptance of themselves.
36	What influence does informal exchange between key players have on the integration of explorative activity team members and how does it take place?	4, 5		cogn	A big influence.

No.	Question	Prop. Fam.	Ad. Info	Tech-nique	Possible answer
Knowledge transfer					
37	How is explorative knowledge transferred into daily business	4, 5		cogn	There is no formal process, it happens by personal interaction between explorative and exploitative key players
38	How is it assured that the daily business can take advantage of the new knowledge (technology)	4. 5		cogn	-
Outlook					
37	What do you think will change within the next year in regard to the organization?	-	Longitud. relevance	proj	The information about the new units will spread top-down and broaden the acceptance of it within the whole company.
38	What do you think will change within the next five years in regard to the organization?	-	Longitud. relevance	proj	The explorative unit will be part of daily business and a leading unit when it comes to market relevance.
Phase out of interview					
39	If you had been the interviewer during this interview, what questions would you have asked me as well?	-		proj	-

No.	Question	Prop. Fam.	Ad. Info	Technique	Possible answer
40	Is there anything unsaid that needs to be said?	-		proj	-
41	How did you feel during the interview and how do you feel now?	-		cogn	Good.

Table 65: Practical interview manual

Source: Author.

8.3. Anonymized Interview list

Case Study	Interview No.	Anonymized Name	Location
1	1	A01	Dübendorf, ZH
1	2	A02	Dübendorf, ZH
1	3	A03	Dübendorf, ZH
1	4	A04	Dübendorf, ZH
1	5	A05	Dübendorf, ZH
1	6	A06	Dübendorf, ZH
1	7	A07	Dübendorf, ZH
1	8	A08	Dübendorf, ZH
1	9	A09	Dübendorf, ZH
1	10	A10	-
1	11	A11	Dübendorf, ZH
1	12	A12	Dübendorf, ZH
1	13	A13	Dübendorf, ZH
1	14	A14	Dübendorf, ZH
1	15	A15	Dübendorf, ZH
2	1	B01	Kloten, ZH
2	2	B02	Kloten, ZH
2	3	B03	Kloten, ZH
2	4	B04	Kloten, ZH
2	5	B05	Kloten, ZH
2	6	B06	Kloten, ZH
2	7	B07	Kloten, ZH
2	8	B08	Kloten, ZH
2	9	B09	Kloten, ZH
2	10	B10	Kloten, ZH
2	11	B11	Kloten, ZH

Table 66: Anonymized interview list

Source: Author.

All interviews took place between April 2014 and September 2014 whereas the dates and exact locations are not mentioned for anonymity reasons.

8.4. Focus Group Manual

8.4.1. Process of the focus group

1. The whole group is always being addressed, not a single person
2. I give topics to discuss about, no precise propositions
3. I am generic by purpose, you should be specific and give explanations
4. I only intervene if the group doesn't „turn“ it into their topic or when the group concludes on reasons, circumstances and behavior
5. Storytelling is wished from your side
6. Imminent questions to the same topic from my side is a sign of „hitting it“
7. Add-on questions follow after reaching the peak of discussing topics
8. Last action of a topic is me dissolving /verifying detected divergence of opinions

8.4.2. Rules of behavior in the focus group

1. Every opinion is respected, don't criticize, evolve instead
2. State how's and why's
3. Co-develop in the group if possible
4. One Person is speaking
5. No side conversations
6. I try to avoid any confirmation or evaluation of inputs (neutral/not influencing)
7. I do intervene when I heard enough of a relevant topic or when the discussion leads towards themes outside the focus of the study
8. If the question is unclear please state: „ Would you explain that further?“

8.4.3. Focus group question guidance

Proposition No.	Topic/Question
1	When are the exploitative players consulted?
1	What are the reasons that exploitative players have such an influence when informally making decisions?
1	What are decisive reasons that explorative players take over exploitative functions once they implemented an innovation?
1	Why are side changers better suited to implement innovation?
2	How are the information that exploitative players get from explorative players usable in regard to decisions to be taken?
2	How do exploitative players use knowledge about radical innovations in their daily job?
2	Do they do incremental innovation with a radical innovation?
2	How can explorative players improve their acceptance so that they are a reference for exploitative players?
2	How can they support the successful implementation of an innovation?
3	What kind of key players support or mitigate/hinder the integration of explorative activities into exploitative activities?
3	How do side changers influence the implementation of explorative activities into exploitative ones (and why)?
3	How do opinion leaders influence a successful implementation of an innovation?
3	What influence does have lobbying?
4	What are the positive effects and prerequisites if there are any?
4	Why is it so important that the explorative players exchange information with the exploitative players in an innovation implementation?
4	What are the reasons that the exploitative players need to be integrated when implementing an innovation with mainly explorative players?
4	What is the influence of trust in the interaction between explorative and exploitative players?
5	What are the reasons that informal information exchange (pos. or neg.) has such an important influence when implementing an innovation?
5	How can it be improved / assured that formal and informal information are aligned?
5	What happens if there is a gap between formal and informal information?
5	How do you judge/evaluate the difference between the two?

Table 67: Focus group question guidance

Source: Author.

Back-up Questions	
	What are explanations that contextual ambidexterity is that high?
	Why can it have also an acceleration effect (positive or negative) when they exchange information?
	Since decisions are mainly built informal (information exchange) but decided formal, how can informal communication be influenced?
	When does the informal information exchange support the integration?

Table 68: Focus group back-up questions

Source: Author.

Following the discussion about the topics above, the current analysis of the interviews will be presented and several thereof derived models and figures discussed regarding their validity among the focus group participants.

8.5. Anonymized focus group list

Case Study	No. of participants	Anonymized Name	Location
1	5	A21, A22, A23, A24, A25	Dübendorf, ZH
2	3	B21, B22, B23	Kloten, ZH

Table 69: Anonymized focus group list

Source: Author.

Both focus groups took place in April 2015 whereas the participants were elected beforehand out of the interviews partners. In order to further anonymize the participants and make traceability of expressions impossible, new anonymized names were used.

