

# **Ambidextrous leadership in innovation management processes:**

Exploring the dynamics of opening and closing leadership behaviors at different levels of the Stage-Gate model

MSc in Business Administration

Handed in by: Tim Voigt  
Weserstr. 42  
63071 Offenbach am Main

Phone: +49 (0)177 / 4816442

Semester: 11. Semester

Supervisors: Prof. Dr. Tanya Bondarouk  
University of Twente  
Drienerlolaan 5  
7522 NB Enschede  
Phone: +31 (0)53 489 3666

Dr. Michel L. Ehrenhard  
University of Twente  
Drienerlolaan 5  
7522 NB Enschede

Prof. Dr. Klaus W. Döring  
Technical University Berlin  
Straße des 17. Juni 135  
10623 Berlin  
Phone: +49 (0)314 766 34

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#### **IV LIST OF ABBREVIATIONS**

AB	Aktiebolag (eng. "corporation")
AG	Aktiengesellschaft (engl. "corporation")
c.f.	Confer (lat. "compare")
e.g.	For examples (lat. "exempli gratia")
Etc.	Et cetera
GmbH	Gesellschaft mit beschränkter Haftung (engl. "limited liability company")
GmbH & Co. KG	German limited commercial partnership (KG) consisting of a general partner (GmbH) and a limited partner (member of the GmbH)
HR	Human Resources
IT	Information technology
i.e.	Id est (engl. that is)
KG	Kommanditgesellschaft (engl. limited partnership)
NPD	New Product Development
n.s.	Not specified
p.	Page
pp.	Pages
PO	Project office

## **V ACKNOWLEDGEMENTS**

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## **VI ABSTRACT**

The following study builds upon the recently proposed theory of ambidextrous leadership for innovation which argues that effective innovation leadership can be achieved by flexibly switching between two different kinds of opposing yet complementary sets of leadership behaviors. Due to the assumed complexity and unpredictability of the innovation process, there has been no attempt so far to study when either of these two leadership behaviors is applicable. Instead both behaviors, namely opening and closing leadership, are demonstrated flexibly according to the respective demands of the innovation task. In this respect, the purpose of this study is to extend the existing theory of ambidextrous leadership from Rosing and colleagues by providing a more differentiated view with regard to its most central assumption about how innovation leadership can be described. The research goal of this study was to explore how both types of leadership behaviors alternate over the course of the innovation process. In this regard, a process view on innovation was taken. On the basis of the Stage-Gate process model opening and closing leadership behaviors were explored during the innovation process. 15 semi-structured interviews with innovation leaders from companies applying the Stage-Gate model were conducted, in order to receive insights about the evolvement of opening and closing leadership behaviors on three different levels of detail: Behaviors constantly shown during the whole process, behaviors predominantly shown at the beginning of the process and at its end, and behaviors especially shown during distinct stages of the innovation process. Results reveal that opening and closing leadership behaviors are both constantly present but occur in different intensity over the course of the innovation process. Thereby findings generally underline the importance of ambidextrous leadership within innovation processes. However, results differ with regard to the kind of Stage-Gate process type applied. In this regard, modern innovation processes types tend to require an increasing behavioral flexibility from innovation leaders compared to earlier process models with their successive process stages. In addition to those results the applied model of ambidextrous leadership is further extended by defining and refining existing and new items of ambidextrous leadership behaviors.

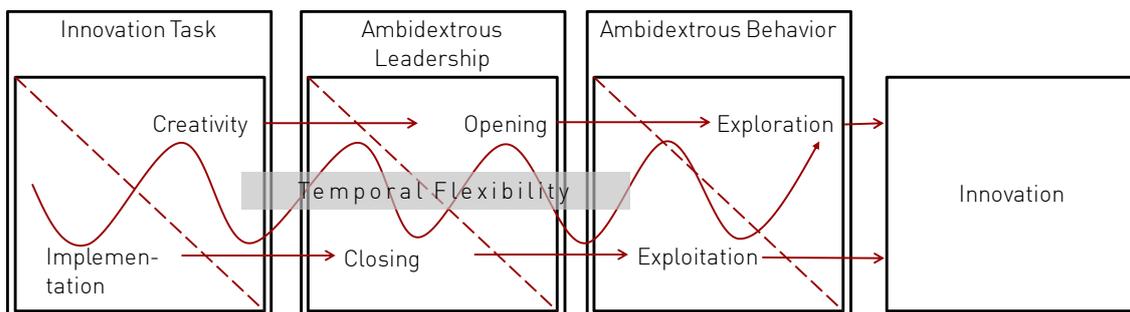
# 1 INTRODUCTION

Over the past six decades the concept and the understanding of innovation has evolved considerably (Rothwell, 1994). Correspondingly, the assumptions about how innovation needs to be managed has changed (Turner & Müller, 2005). Today, leadership is supposed to be one, if not the most important, predictor of innovation (Jansen, Vera, & Crossan, 2009). Besides the development of important key capabilities for innovation such as technological or research and development capabilities (Oke, Munshi, & Walumbwa, 2009), leadership was found to be the decisive factors for the successful execution of new product developments (Lewis, Welsh, Dehler, & Green, 2002; Williams, 2005). In this regard, innovation success does largely depend on the efficient and effective implementation of innovation activities by the leader (Barczak & Wilemon, 1989). However, studies considering the link between leadership and innovation mainly reveal controversial results (Rosing, Frese, & Bausch, 2011). In order to explain this inconsistency of existing findings, some researchers argue that leaders are continuously challenged to simultaneously manage conflicting demands though the complex and unpredictable innovation processes (Bledow et al., 2009). Those include for example the management of current and new activities, the combination of short-term and long-term thinking, and the promotion of a motivating vision while staying focused on the execution of current tasks (Probst, Raisch, & Tushman, 2011).

This notion links to the concept of ambidexterity as originally defined by March (1991) in the context of organizational learning. He argues that a lasting organizational performance can only be reached, if a company is able to balance exploration and exploitation activities. In this respect, exploration activities include innovation, risk taking, experimentation and flexibility which foster variety and enable adaptability of an organization to environmental changes in the long run. On the other hand, exploitation activities refer to the execution, implementation, and refinement and aim to increase efficiency and improve the alignment to the current organizational environment (March, 1991). Thus, ambidextrous organizations are able to effectively manage current business requirements, while stay-

ing adaptive to long-term environmental changes (Gibson & Birkinshaw, 2004). Even though originally applied to the firm level, the achievement of organizational ambidexterity is first of all a leadership challenge (Probst et al., 2011). In this regard, leadership was found to be an important antecedent of organizational ambidexterity (Raisch & Birkinshaw, 2008). Even though research about organizational ambidexterity with regard to the firm level has thoroughly been covered in the literature (Raisch & Birkinshaw, 2008), there are few studies considering ambidexterity on the individual level (Keller & Weibler, 2014). While in the area of leadership studies, most focus on the overall firm performance, only few consider the link between leadership and innovation (Oke et al., 2009). Moreover, studies with focus on the link between leadership and innovation mainly reveal controversial results (Rosing et al., 2011). In this respect, Rosing et al. (2011) propose the first theory of ambidextrous leadership to the context of innovation management and with focus on the individual level of project leadership. Their study follows up on the request for research methods which are able to capture complex and dynamic processes over longer time periods (Yukl, 2009). In contrast to most existing leadership schools which have been applied to project leadership (Turner & Müller, 2005), Rosing and colleagues argue that a single leadership style is too brought in nature and cannot effectively promote innovation. Instead, different leadership styles, which are attributed to single leadership theories (e.g. transformational and transactional leadership, or Leader-member exchange theory), need to be applied in combination. Former studies promoting ambidextrous leadership either have different foci (e.g. CEO or other management levels instead of project leaders for new product development projects), or different research goals (firm performance instead of innovation performance), and suggest leadership behaviors which are supposed by Rosing et al. (2011) to both promote and hinder innovation. On the basis of March (1991), Rosing et al. (2011) apply the concept of exploration and exploitation to project leaders of innovation processes. Accordingly, a leader is required to foster exploration and exploitation in followers' behavior by showing two different types of leadership behaviors which are supposed to especially reflect leadership behaviors of the innovation process. In the theoretical model of Rosing et al. (2011), those contradictory leadership behaviors are termed as opening and closing

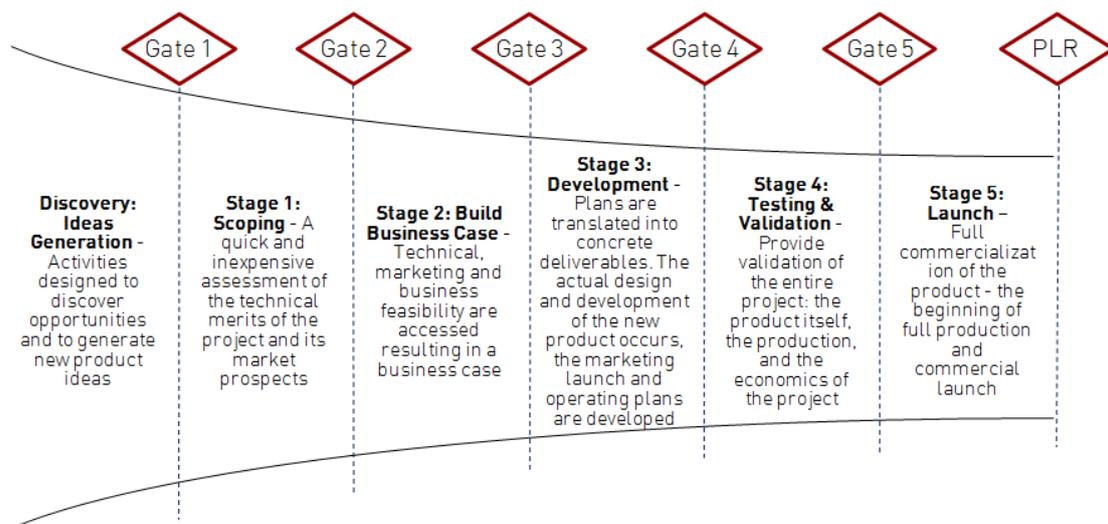
leadership (see figure 1). Depending on the specific requirements of the innovation task, leaders are expected to flexibly switch between opening and closing leadership behaviors. As indicated in figure 1, the innovation task generally supposed to consists of an iterative cycle of idea generation and idea implementation (Amabile, 1988). In this respect, an activity of the innovation task which asks for creativity is considered to require opening leadership behaviors in order to foster exploration in followers' behavior. Respectively, an activity of the innovation task demanding implementation requires a leader to show closing behaviors in order to foster exploitation in followers' behaviors. The switching between creativity and implementation requires a temporal flexibility of the leader and is indicated by the oscillating arrows. So far Rosing et al. (2011) assume that creativity and implementation cannot be attributed to specific stages of the innovation process, but are permanently required along the whole process. Accordingly, innovation leaders always need to be prepared to switch between opening and closing leadership behaviors.



**Figure 1: Proposed model of ambidextrous leadership (adapted from Rosing et al., 2011)**

The study at hand builds up upon the proposed theory from Rosing et al. (2011) who ask for research which “systematically consider(s) the complexity of the innovative process” (p.971). In this respect, the focus of this research lies on the existing theory of ambidextrous leadership by exploring opening and closing leadership. So far phases of implementation are assumed to alternate constantly though the innovation process in an unpredictable manner. However, studies which have explored leadership within innovation processes found that project leadership evolves over the course of the innovation process and require the leader to show different behaviors within different innovation contexts (Bass,

2008; Dulewicz & Higgs, 2004), and during different stages of the innovation process (Frame, 1987; Jansen et al., 2009; Markham, 2013; Oke et al., 2009). Thus, the goal of this research is to explore how opening and closing leadership behaviors evolve over the course of the innovation process. In this regard, the proposed theory of ambidextrous leadership is explored by taking a process view on innovation (Cooper, 1990, 2014; Crawford & Di Benedetto, C. Anthony, 1994; Eppinger & Ulrich, 1995). In this respect, the author uses the Stage-Gate model (Cooper, 1990), as the most often applied process model for the management of product developing processes (Cooper, 2014). The process model splits up the innovation task into different stages which are separated from each other by gates (see figure 2). It is represented as a funnel where many ideas enter the process and few innovations emerge at the end. Over time, three different generations of Stage-Gate models have been developed over time, which will all be considered in this study (Cooper, 1994; Cooper, 2014).



**Figure 2: Traditional Stage-Gate innovation process model (adapted from Cooper, 1990)**

The focus of this study solely lies on the model of ambidextrous leadership defined by Rosing et al. (2011). Due to the newness of the proposed ambidextrous leadership theory, there are no existing studies which have considered a process view on innovation in order to explore opening and closing leadership behaviors along the new product development (NPD) process. However, some authors have formerly attributed different leadership styles to different stages of the innovation process which will be considered during the discussion of the study

(Frame, 1987; Turner, 1999; Verma & Wideman, 1994). In the following, the outline of this study is presented.

Following the introduction, the literature review of chapter 2 provides the theoretical background for this study. In this respect, chapters 2.1 and 2.2 introduce the main topics of this research, ambidextrous leadership and the Stage-Gate innovation processes model. In chapter 2.3 both topics are merged and theoretical model is developed. Chapter 3 describes the methodology including the application of template analysis. Chapter 4 covers the results and is divided up into three major sections in which opening and closing leadership behaviors are explored on three different levels of detail. First, in chapter 4.1 opening and closing leadership behaviors are presented which were found to be constantly present over the whole process level including the leadership behaviors around gate meetings. In chapter 4.2, differences between leadership behaviors at the beginning of the process compared to its end are contrasted on a second level of detail. On the third and most detailed level of analysis, chapter 4.3 presents the dynamics of opening and closing leadership with regard to every single stage of the process. During the discussion in chapter 5, results are interpreted on all three different levels introduced during the results chapter. Moreover, the theory of ambidextrous leadership and the suitability of the Stage-Gate model in this research are reflected upon. Following the limitations, implications for management and future research are provided. Finally, the conclusion sums up the research and its major contributions to ambidextrous leadership.

## 2 LITERATURE REVIEW

The following literature review initially covers the concept of ambidexterity and highlights its application to various settings. Within the field of individual or contextual ambidexterity, ambidextrous leadership represents a specific research area. In order to get an impression about how other researchers already have applied the concept to different areas of application, the literature on ambidextrous leadership is shortly reviewed before introducing a model of ambidextrous leadership which is especially focusing on the innovation context. Afterwards, chapter 2.2 initially argues why the Stage-Gate model has been applied in order to study ambidextrous leadership. Since the model has been adapted over time to represent the respective innovation process requirements, different Stage-Gate generations are described during this chapter, since they will all be considered for the exploration of opening and closing leadership. Finally, chapter 2.3 merges the formerly separated topics of ambidextrous leadership and Stage-Gate and develops the theoretical model for this study.

### **2.1 AMBIDEXTROUS LEADERSHIP**

Chapter 2.1 introduces the concept of ambidexterity within several contexts and covers its application within leadership theory before the model from Rosing et al. (2011) is introduced.

#### **2.1.1 Introducing the Concept of Ambidexterity and Ambidextrous Leadership**

In order to be able to understand the theory of ambidextrous leadership, the concept of ambidexterity in its different areas of application need to be introduced. Ambidexterity literally refers to the capability of a human being to use both hands with equal ease. The concept was first introduced to the organizational context by Duncan (1976) and describes companies with the ability to do two different things at the same time. More precisely, organizational ambidexterity refers to the ability of an organization to efficiently manage current businesses while staying adaptive to future requirements at the same time (Raisch

& Birkinshaw, 2008). In this context, the efficient management of current businesses is linked to the term exploitation, while the ability to adapt to future requirements is linked to the term exploration. Exploitation, for example refers to risk avoidance, adherence of rules and alignment while exploration comprises risk taking, experimentation and opportunity seeking (March, 1991). Organizations which are able to balance exploration and exploitation were found to reach a superior firm performance and generate an increased innovation output (e.g. Chang & Hughes, 2012; Gibson & Birkinshaw, 2004; Tushman & Reilly, 1996). Moreover, empirical support for the concept was provided by He and Wong (2004) with regard to sales performance and by a study of Katila and Ahuja (2002) who found apposite impact of ambidexterity on new product development (Katila & Ahuja, 2002). Within organizational management the concept is used to explain multiple organizational phenomena (Simsek, 2009), including the influence of individual managers on organizational ambidexterity which will be the focus of this study (Eisenbeiss, van Knippenberg, & Boerner, 2008). In spite of numerous studies about organizational ambidexterity, it remain an underdeveloped phenomenon, especially with regard to how the balance between exploration and exploitation can be achieved (Gupta, Smith, & Shalley, 2006).

In his literature review, Simsek (2009) classifies existing definitions of organizational ambidexterity into the following categories: realized, structural and behavioral (also referred to as contextual ambidexterity or individual ambidexterity; Bonesso, Gerli, & Scapolan, 2013). Each category thereby covers a different level of analysis: the realized perspective defines ambidextrous organizations in terms of the actual attainment of explorative and exploitative behavior with regard to the ability to successfully pursue incremental and radical innovations (Simsek, 2009). Structural ambidexterity refers to the organizational setup and structure in which separate subunits, including specific competencies, are responsible for exploration or exploitation. In this regard, dual structures are supposed to particularly support organizational ambidexterity. However, although the organization is structurally separated, organizational ambidexterity is achieved by a common vision and a shared set of values and mechanisms of

structural connections. Without that shared goal and interconnections between subunits, the organization would experience a loss of organizational efficiency for examples due to the lack of communication between departments or the duplication of work.

However, structural ambidexterity only focuses on the organizational structure without taking the individual contribution to ambidexterity into account (Bonesso et al., 2013). Therefore, behavioral ambidexterity, more often referred to as contextual or individual ambidexterity (Bonesso et al., 2013; Gibson & Birkinshaw, 2004), refers to the capacity of business unit members to simultaneously foster alignment and adaptability. Alignment refers to the ability to accommodate all areas of activity to a defined objective. Adaptability describes the individual's ability to quickly reconfigure activities in order to adapt to changing environmental demands. In summary, whereas the realized perspective describes the state of high organizational ambidexterity, the structural perspective focuses on the processes and mechanisms to achieve ambidexterity. Finally, the contextual perspective focuses on the individual level and acknowledges that the achievement of organizational ambidexterity is foremost a leadership challenge (Probst et al., 2011).

Besides the model from Rosing et al. (2011), studies considering the individual level of ambidexterity on the management level have been contributed for example by Vera and Crossan (2004) who established the term ambidextrous leadership within organizational learning theory and assumed that the creation of a learning culture, is affected by the leaders' ability to balance transformational and transactional leadership behaviors (Vera & Crossan, 2004). Later on, Mom, Van den Bosch, Frans, and Volberda (2007) defined ambidexterity as the behavioral orientation of managers to combine exploration and exploitation related activities within a certain time period. They found empirical support that ambidexterity cannot only be pursued at the firm level but also at the individual level. Bucic, Robinson, and Ramburuth (2010) build up upon the model from Vera and Crossan (2004) and found empirical support for their model which proposes

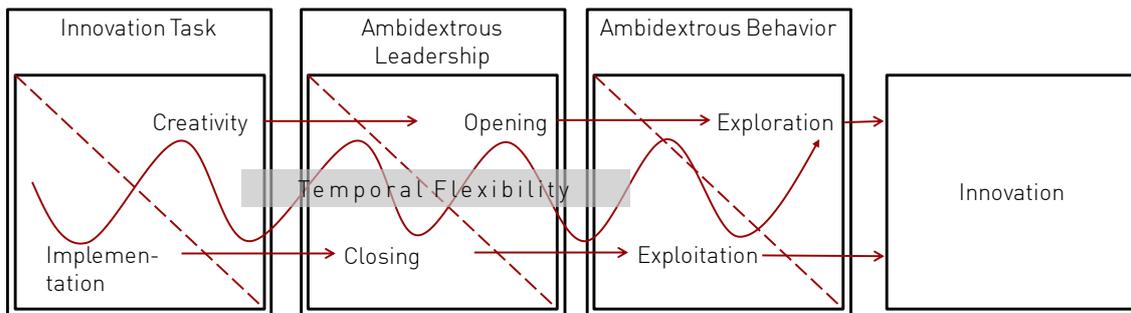
transformational leadership in dynamic environments and transactional leadership in stable environments. However, they admit that organizational leaders do usually not have the choice between either of the two styles and therefore need to take an ambidextrous leadership approach in order to effectively support organizational learning. A recent study by Laureiro-Martínez, Brusoni, and Zollo (2010) adopt a neurological perspective on ambidextrous leadership and argue that individual ambidexterity is not realized by the allocation of explorative and exploitative tasks but by the ability of a leader to change his scope from broad to narrow or as defined by Laureiro-Martínez et al. (2010) from the phasic mode to the tonic mode. Similarly to Rosing et al. (2011) the studies presented above all apply their own definition of individual ambidexterity on the management level by defining two poles in order to represent exploration and exploitation. Other studies in the area of ambidextrous leadership take a different focus on the research field, for example by providing suggestions for the identification of ambidextrous leaders (Chi, 2012) or by emphasizing the need for ambidextrous leadership in real life (Probst et al., 2011).

### **2.1.2 Ambidextrous Leadership for Innovation**

Even though empirical findings underline the importance of the individual level of ambidexterity, the research field is still underdeveloped (Bonesso et al., 2013; Gibson & Birkinshaw, 2004). In this respect, Rosing et al. (2011) are the first who study ambidextrous leadership with focus on the innovation context. In contrast to existing studies, which focus on the overall firm performance, they shift the focus to innovation performance (Bonesso et al., 2013; Gibson & Birkinshaw, 2004; Probst et al., 2011). Thereby the authors account for the unique leadership requirement which are supposed to largely differ from those applicable for the management of operations (Williams, 2005). In contrast to the rather linear and repetitive structure of administrative tasks, innovation processes are supposed to be non-linear and highly complex (Anderson, De Dreu, Carsten K.W., & Nijstad, 2004). Besides different output and performance measurements (Elkins & Keller, 2003), the innovation task asks for a continuous management of conflicting demands such as the management of current and new activities or

short-term and long-term thinking (Bledow et al., 2009). In this context, Rosing et al. (2011) develop their own set of behaviors which are supposed to be relevant especially during the innovation process. The theory of ambidextrous leadership introduced below argues that a single leadership style, as suggested by earlier leadership schools applied to the context of project management (Turner & Müller, 2005) cannot effectively promote innovation. Instead, different leadership behaviors need to be applied in combination depending on the changing requirements through the innovation process. In contrast to former studies in the innovation context, Rosing et al. (2011) argue that innovation is not only promoted by creativity (e.g. Gumusluoglu & Ilsev, 2009; Ohly, Sonnentag, & Pluntke, 2006; Zhou, 2003) but also requires the implementation of ideas (Farr, Sin, & Tesluk, 2003). Based on this definition, Rosing et al. (2011) divide the innovation task into the stages creativity and implementation (Amabile, 1988). Both stages of the process represent very different and even opposing requirements to their management. On the one hand, creativity focuses on experimentation, thinking “outside the box” and going beyond common assumptions, and is thus closely linked to the concept of exploration as defined by March (1991). On the other hand, implementation requires a focus on “efficiency, goal orientation, and routine execution” (Rosing et al., 2011, p. 965) and can be linked to exploitative activities as defined by March (1991). So far the authors of ambidextrous leadership assume that due to the complexity of the innovation process one is unable to clearly separate phases of creativity and implementation (Rosing, Rosenbusch, & Frese, 2010). Thus, Rosing et al. (2010) do not support the original definition from March (1991) that exploration and exploitation are mutually exclusive but rather consider both activities as mutually interdependent. Accordingly, it is assumed that phases of creativity also require exploitation, since creative ideas can profit from the exploitation of existing company knowledge (Bain, Mann, & Pirola-Merlo, 2001). Similarly, phases of implementation also require exploration, since strategies need to be adapted or require completely new ways of product implementation that require explorative activities (van de Ven, 1986). In this respect, individuals and teams within the innovation process are required to continuously switch between exploration and exploitation during the whole innovation process.

Ambidextrous leadership is defined by Rosing et al. (2011) “as the ability to foster explorative and exploitative behaviors in followers by increasing or reducing variance in their behavior and flexibly switching between those behaviors. That is, ambidextrous leaders are able to support their followers in the attempt to be ambidextrous” (Rosing et al, 2011, p.957). Their ambidextrous leadership model consists of three elements: First, opening leadership behaviors which are necessary to foster exploratory team behavior, second, closing leadership behavior in order to support exploratory team behavior, and in the third place, the leaders’ temporal flexibility to switch between both behaviors according to the respective requirements of the situation in the innovation process. Figure 3 provides a representation of the current model.



**Figure 3: Proposed model of ambidextrous leadership (adapted from Rosing et al., 2011)**

In situations where the innovation task requires creativity, opening behaviors are shown by the leader in order to foster exploration in followers’ behaviors. Likewise, in situations where the innovation task requires implementation, closing behaviors are demonstrated by the leader in order to encourage exploitation in followers’ behaviors. Since the innovation task is supposed to require a regular switching between creativity and implementation, the innovation leader constantly needs to change between opening and closing behaviors to initiate explorative or exploitative actions of the innovation team. This continuous switching is represented by the oscillating arrows in figure 3. The table below shows examples of opening and closing leadership behaviors which are supposed to represent leadership behaviors of the innovation process (see table 1).

**Table 1: Examples for opening and closing leadership behaviors (Rosing et al., 2011)**

<b>Opening leadership behaviors</b>	<b>Closing leadership behaviors</b>
Allowing different ways of accomplishing a task	Monitoring and controlling goal attainment
Encouraging experimentation with different ideas	Establishing routines Taking corrective action
Motivating to take risks	Controlling adherence to rules
Giving possibilities for independent thinking and acting	Paying attention to uniform task accomplishment
Giving room for own ideas,	Sanctioning errors
Allowing errors	Sticking to plans
Encouraging error learning	

Ambidextrous leadership was initially proposed to the innovation context in 2010, the model was published in 2011, and first empirical support was provided by a quantitative study in 2014 (Zacher & Rosing, 2014). However, the theory is still in its infancy and Rosing et al. (2011) suggest various possibilities for its improvement. Among the future research implications, Rosing et al. (2011) first of all call for studies which “systematically consider the complexity of the innovation processes” (Rosing et al., 2011, p. 971). So far the authors assume that the innovation process cannot be split up into distinct stages. Instead, the requirements of the innovation task can switch from creativity to implementation in an unpredictable manner. Consequently, a project leader is supposed to frequently reflect on the current requirements of the innovation task and show the respective opening or closing leadership behaviors toward the innovation team. Until now, the understanding about this central mechanism of opening and closing leadership behavior lacks a detailed understanding. Additional insights with regard to this theoretical aspect were therefore considered to be highly important for the theory development and its subsequent empirical application. In order to study opening and closing leadership behaviors during the innovation process, this research questions the assumption that creativity and implementation cannot be separated at all and applies a process view on innovation in order to find out when and how opening and closing leadership behaviors are shown over the

course of an innovation project. In this regard, the author applies the widely accepted view that innovation is realized through to a process (Cooper, 1990, 2014; Crawford & Di Benedetto, C. Anthony, 1994; Eppinger & Ulrich, 1995).

## **2.2 INTRODUCING THE STAGE-GATE INNOVATION PROCESS MODEL**

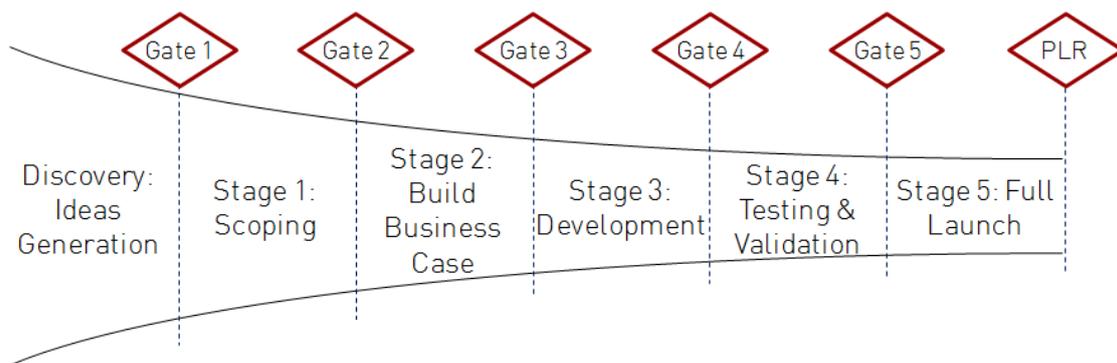
The following chapter introduces the Stage-Gate model as the underlying basis for the exploration of opening and closing leadership behaviors. Over the past two decades three Stage-Gate generations have emerged, which are still applied by companies today in different innovation contexts in order to organize their product development processes (Nobelius, 2004; Rothwell, 1994; Verloop, 2004). For this reason, they will be all taken into consideration for the study of ambidextrous leadership.

### **2.2.1 The Concept of Stage-Gate**

Within innovation management process models help to conceptualize the innovation process in order to generate and select ideas and organize its transformation into an innovation (Kotsemir & Meissner, 2013). In order to effectively manage their product development processes, most companies use some kind of structured “idea-to-launch process” (Cooper, Edgett S., & Kleinschmidt, 2002). The literature of innovation management suggests various models for the representation of innovation processes (Kotsemir & Meissner, 2013). However, there is no standard model and many different process representations exist within the innovation management literature (Verworn & Herstatt, 2000). Cooper (1990) has developed today’s most widely applied Stage-Gate model which can be assigned to the normative process models. According to the Product Development and Management Association, the Stage-Gate model is applied in its different forms by 69% of product developing companies in the U.S (Schneider, 2005). It was initially derived from a Coopers & Lybrand survey in 1995 which assessed the reasons behind failure rates of new product developments (Coopers & Lybrand Consulting Group, 1985). Its popularity among leading product developing companies (Cooper, 2008), its graphical simplicity, as well as the

continuous updates of the model to latest product development standards (generations) for almost 20 years led to its application within the study at hand.

The model is described by Cooper (2008) as a “conceptual and operational map” or “blueprint” (p.2). It “takes the often complex and chaotic process of taking an idea from inception to launch, and breaks it down into smaller stages and gates in its entirety (...) into one complete, robust process” (“The Stage-Gate® product innovation process | Stage-Gate international,” 2014). The process can be imagined as a funnel with many ideas entering at the beginning and few products emerging in the end (see figure 4).



**Figure 4: Traditional Stage-Gate process (adapted from Cooper, 1994)**

The process begins with the discovery (stage 0). This is the ideation stage which includes the necessary pre-work of idea generation and the discovery of business opportunities. The scoping (stage 1) includes the preliminary, fast and inexpensive investigation of the technical merits and the potential market opportunities of the project. Build business case (stage 2) covers the detailed investigation in terms of technical, marketing and business feasibility, which results in a business case, including the specification of the product and the development plan. The development (stage 3) focuses on the actual product design and its development including the design of the operations and the production processes for the subsequent full scale production. Testing and validation (stage 4) relates to the entire validation of the project including the product, production processes and the economics of the project. This comprises tests and trials on the

target market. The launch (stage 5) contains the full commercialization with regard to production, marketing and sales of the product ("The Stage-Gate® product innovation process | Stage-Gate international," 2014).

Each stage of the innovation process includes a set of best-practices. Those are activities which are required or recommended in order to proceed with the project to the next gate. The stages are implemented in order to reduce key project uncertainties and risks by gathering specific project information and setting a certain requirement level for the project to pass the following gate. Those requirements increase along the process, as the costs of each stage is higher, while project uncertainties are decreasing along the process. Activities within the stages may proceed in parallel and by teams of people from different functions. Furthermore, there is no separate R&D-, Engineering-, or Marketing-stage. Instead, stages are cross-functional (Cooper, 2008).

Before a project is allowed to move from one stage to the other, gates are implemented in which the project is evaluated according to pre-defined criteria. Depending on the complexity of the project, the process can differ in length and depth. However, all major activities need to be considered in any case although the depth of assessment might vary (Cooper, 2008, 2014).

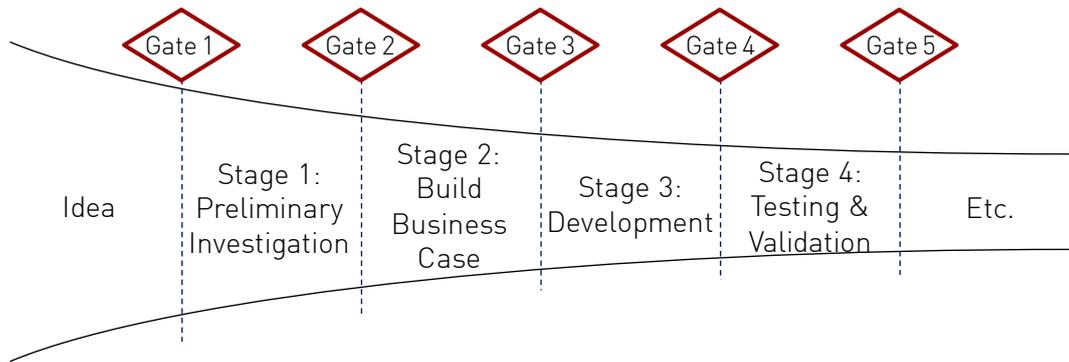
The gates at the end of each stage reflect decision points where projects are either continued or cancelled (Go/Kill decision). These decisions are made by a cross-functional team of gatekeepers. Those are senior managers who own the necessary resources for the project to be continued. Project leaders are not part of that group but striving for resource commitment from the resource owners (gatekeepers). Gate meetings result in a Go/Kill decision, an action plan, including the deliverables brought to the next gate meeting, and a date for the upcoming gate. (Cooper, 2008)

## 2.2.2 Evolution of Stage-Gate Model Generations

Since the development of Stage-Gate in 1990, Cooper has adapted the model continuously according to the changing innovation requirements. Over time different Stage-Gate generations have emerged. The distinction between those generations will become important during later chapters, since different companies are supposed to apply different process generations in order to organize and manage their innovation process.

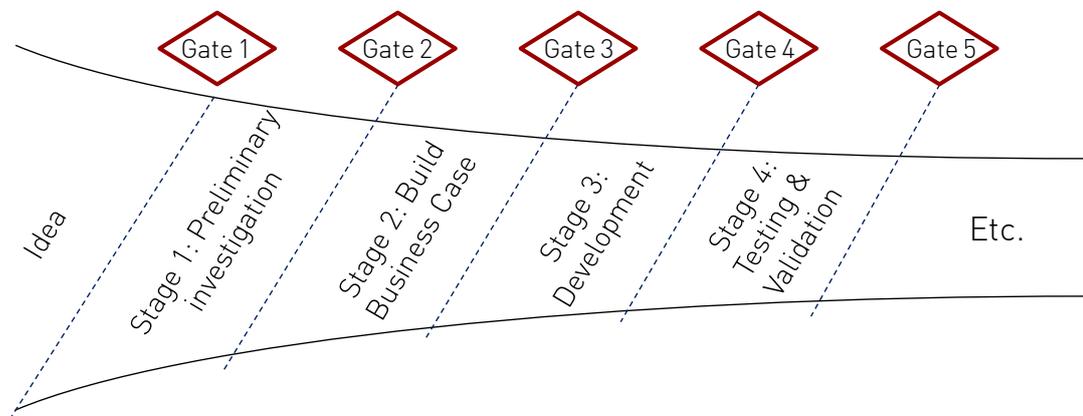
According to Cooper, the first generation of Stage-Gate models is the NASA-based *Phased Review Process* of the 1960s by which the first moon landing was organized (Cooper, 1994). Their process model demonstrated a high level of detail and broke down the development into separate phases with review points at the end of each phase. For this large-scale project, the process served as a measurement and control tool. However, due to its high level of detail, with cumbersome review cues and increased bureaucracy the process was slow (Cooper, 1990; Cooper, 1994). However, during those times project management tools were not yet applied within the broader economy (Rothwell, 1994). This first generation is therefore not considered to be relevant during the rest of the study.

Between the mid 1960s and late 1970s, project management instruments were initially introduced (Rothwell, 1994). A depiction of the first Stage-Gate model can be seen below (see figure 5). Compared to the first generation which is focused on engineering, the 2<sup>nd</sup> generation is cross-functional. Due to the fact that sequential processing would increase development time, especially when multiple parties are involved at the same time, parallel processing is introduced. Despite its cross-functionality, the stages follow in succession and project management instruments enable the structuring of multi-disciplinary projects (Rothwell, 1994). Cooper admits that this 2<sup>nd</sup> generation is no panacea, but has some drawbacks. For example, bureaucracy is one of the negative aspects. Furthermore, phases do not overlap and projects have to wait at the gates until all tasks are accomplished. Both aspects slow down the process (Cooper, 1994).



**Figure 5: 2<sup>nd</sup> Generation Stage-Gate process (adapted from Cooper, 1994)**

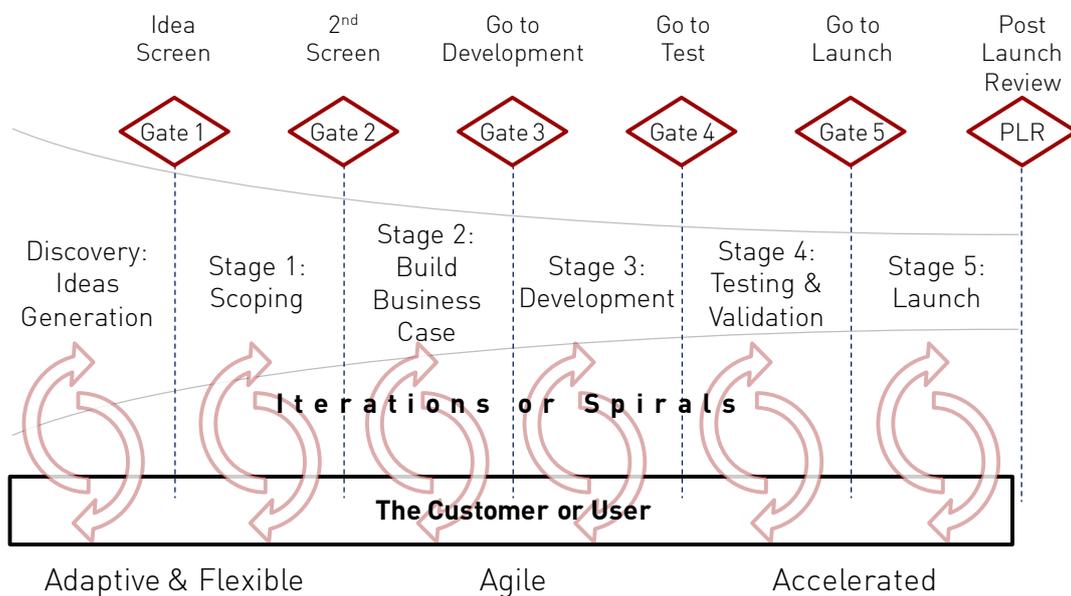
The 3<sup>rd</sup> generation Stage-Gate process intends to overcome the drawbacks of the former model by speeding up the process and reaching a more efficient resource allocation. This 3<sup>rd</sup> generation is characterized by fluidity, fuzzy gates, increased focus and flexibility (Cooper, 1994). First, fluidity refers to the adaptability of the model in which tasks of the next stage can already be performed before the former gate is passed. Secondly, fuzzy gates enable a project to be continued under a “conditional go” in contrast to an absolute go decision. *Focused* refers to the implementation of prioritization methods with respect to the entire company project portfolio. This enables a more focused resource allocation on the most promising projects. In terms of flexibility, Cooper (1994) argues that not every project needs to pass all gates, neither it has to go through all stages, nor perform every activity of the standard process framework. Instead, the process is adapted individually to the project. The respective process illustration can be found below (see figure 6).



**Figure 6: 3<sup>rd</sup> generation Stage-Gate process (adapted from Cooper, 1994)**

After the introduction of the 2<sup>nd</sup> and 3<sup>rd</sup> generation Stage-Gate processes, Cooper (2014) recently provided another update of his model. However, he does not argue in favor of a 4<sup>th</sup> generation Stage-Gate models, but presents directions of an upcoming “next generation”. This study thus considers three different generations of Stage-Gate models: 2<sup>nd</sup>, 3<sup>rd</sup>, and next generation. In this regard, the following section focuses on how Cooper describes those next generation processes.

Based on insights from companies which are using Stage-Gate for their NPD processes, Cooper adapts the model towards a more adaptive and flexible, agile, and accelerated process in order to meet today’s innovation process requirements. The model applies to “bigger, bolder and more venturesome” (Cooper, 2014, p. 29) innovations targeting less defined but rapidly growing markets in which the reliance on new technologies enhances technological risks. Under those conditions, companies have started to adapt their Stage-Gate process in order to better interact with their customers or users (see figure 7).



**Figure 7: Next generation Stage-Gate process (adapted from Cooper, 1994)**

In order to cope with those innovation requirements, companies increase adaptability and flexibility by incorporating spiral or iterative development. As indicated in figure 7, adaptability and flexibility is especially relevant at the beginning,

since products are sometimes less than 50% defined at the beginning of the development stage.

Agility mainly refers to new approaches towards software development. Scrum is the main keyword with regard to software development methods in this context which was initially introduced by Schwaber (2004). A more detailed description of the concept is provided by Cohn (2010). Those approaches enable shorter development cycles within sprints of a few weeks. In the end of each sprint, a functioning prototype can be delivered and tested. Due to the increasing iterations, feedback loops increase and enable faster product improvements within relatively short time frames. Scrum increases the number of milestones and emphasizes lean product development by decreasing bureaucracy at the same time. Wasteful development tasks are prevented by maximizing the value added for the customer (Cohn, 2010).

Acceleration focuses on the project development speed in the end of a process. As already introduced in the 3<sup>rd</sup> generation model, stages, and activities within the stages are allowed to overlap. Even more important, due to the introduction of agile development methods, design-build-test iterations or spirals are promoted. Thereby the notion of stages becomes blurred. Even though gates are still part of the process, they become less relevant compared to traditional models. Go/Kill decisions can be made at the milestones, gates and portfolio reviews along the way and are not exclusively tied to the gate meetings (Cooper, 2014).

The increasing process individuality and situational adaptability of innovation activities emphasized by Cooper (2014) directs towards the assumptions by Nobelius (2004) who argues that the bundle of best practices applied in innovation processes become unique to the situation of the company. Nevertheless, even though product development stages are increasingly overlapping, companies still organize their innovation activities within a process framework (Cooper, 2014).

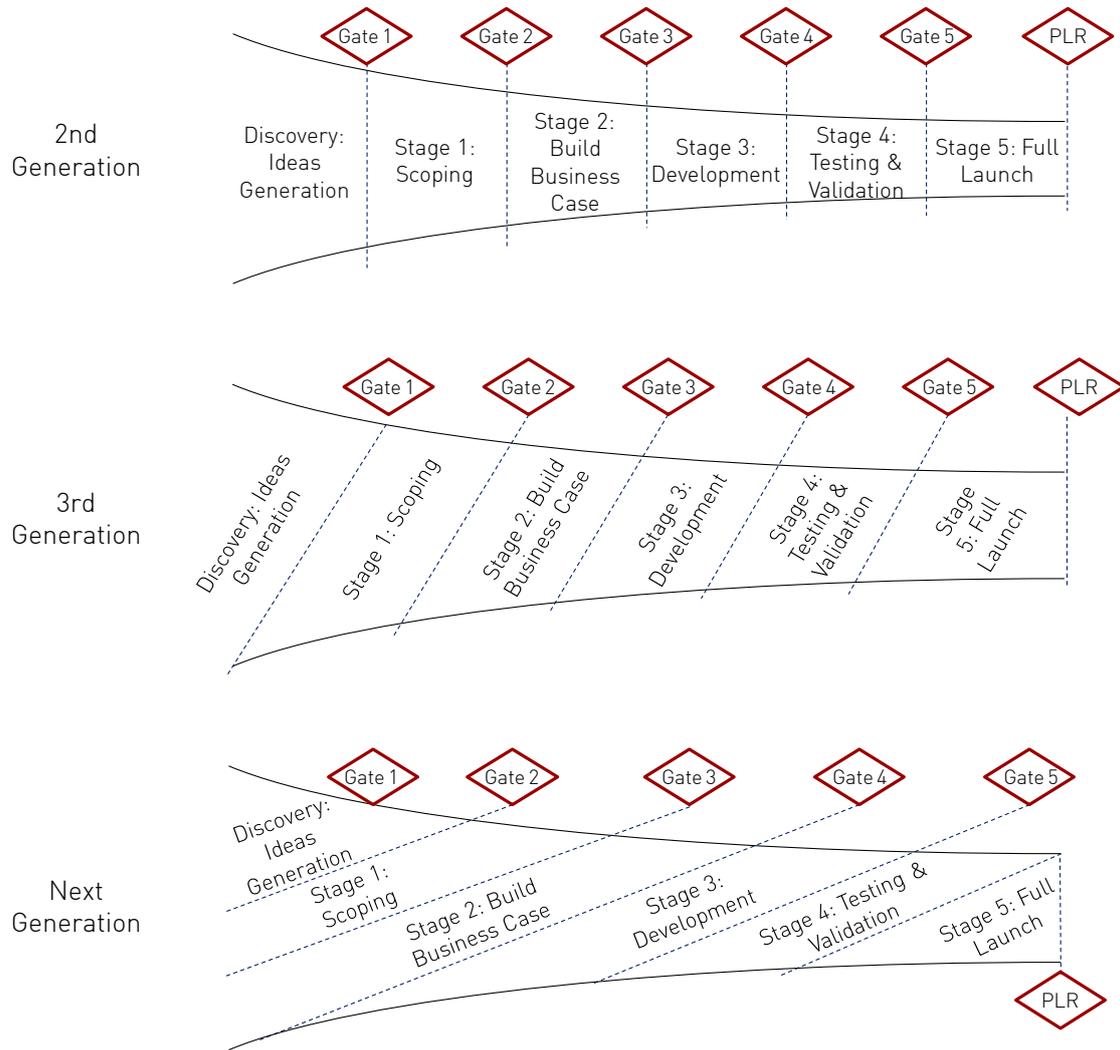
## **2.3 AMBIDEXTROUS LEADERSHIP AND STAGE-GATE**

Based on the insights about ambidextrous leadership and Stage-Gate, chapter 2.3 develops the theoretical model for the exploration of opening and closing leadership behaviors along the Stage-Gate innovation process.

From the review of Stage-Gate innovation processes, three different Stage-Gate generations have been identified. Following Ortt and van der Duin (2008), companies still apply different Stage-Gate generations, depending on their individual innovation context. Therefore, all generations are considered to be relevant for the exploration of opening and closing leadership behaviors. Figure 8 shows a depiction of all three Stage-Gate generations, emphasizing the increasing overlapping of stages across generations.

Based on the Stage-Gate model, the dynamics of opening and closing leadership behaviors will be explored on three levels of process detail (see figure 9). Since Stage-Gate exactly specifies the activities of each single stage, this study is able to explore leadership behaviors on the individual process level. Similar attempts to attribute generic leadership styles to specific stages of the innovation processes have been made by Frame (1987), Turner (1999) and Verworn and Herstatt (2000). In this regard, it is supposed that also opening and closing leadership behaviors might show different dynamics along different stages of the innovation process. In addition to the six different stages, the dynamics of leadership behaviors before and after gates will also be considered. The practice to implement gate meetings at certain point along the project is specific to the Stage-Gate model. As already explained, the date for the upcoming gate meeting is agreed upon during the previous gate meeting. In addition, the project status which needs to be delivered, is defined in advance (Cooper, 2008). This requires a timely delivery and therefore is supposed to impact the leadership behaviors. Since according to Cooper (2008) the project team does not personally partici-

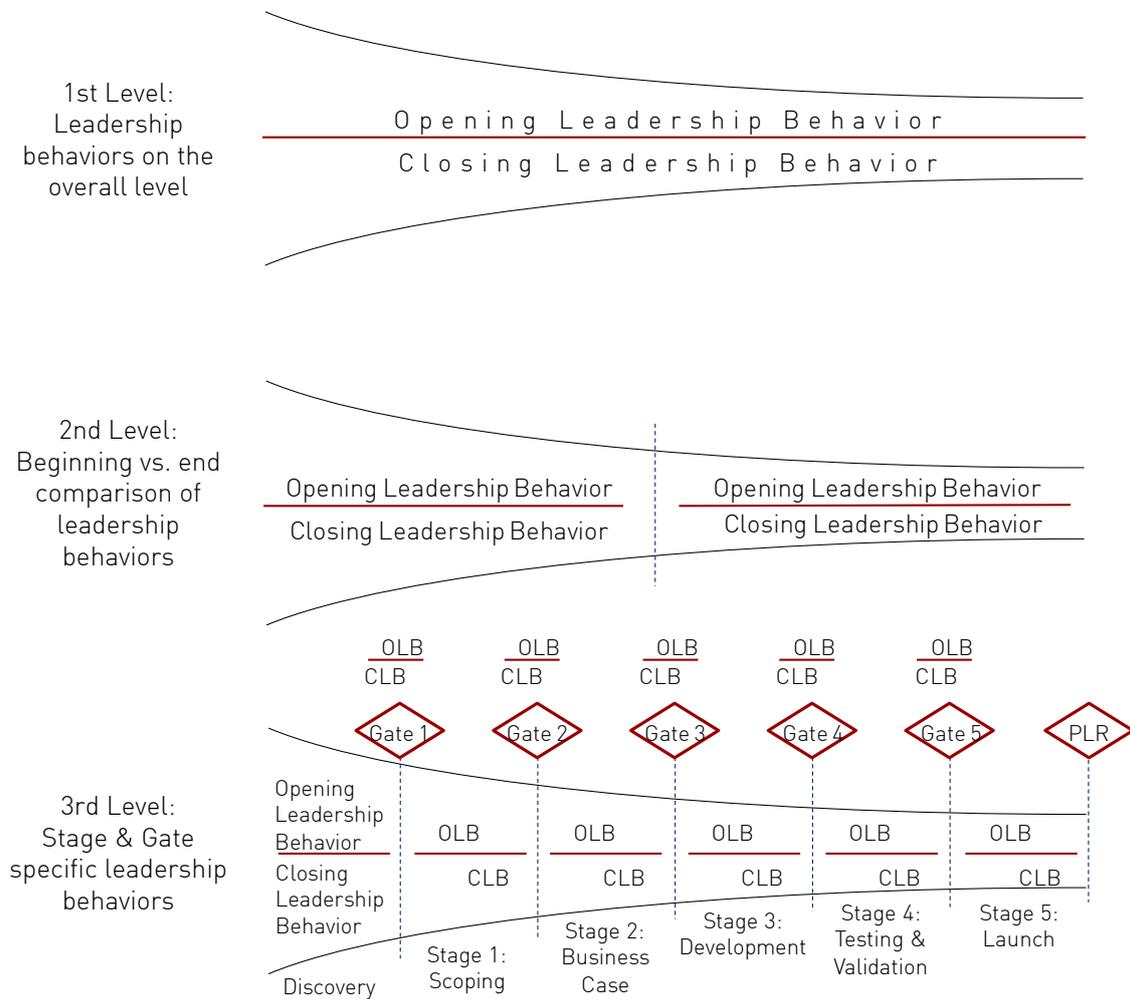
pate at the gate meeting, it was decided to explore opening and closing leadership behaviors around and not during the gate meetings.



**Figure 8: Overview of Stage-Gate generation considered for the exploration of opening and closing leadership behaviors (adapted from Cooper, 1994; Cooper, 2014)**

On a second level of detail, this study will consider differences of opening and closing leadership behaviors between the beginning and the end of the innovation process. In this regard, the dynamics of leadership behaviors will be considered on a more simplified level of analysis within a two-fold model. Other researchers have found evidence that leadership behavior at the beginning of a process different compared to the end of a process (Cheng & van de Ven, 1996; West, 2002). In this regard, differences of opening and closing leadership behaviors at the beginning and at the end of the process will be explored. On a third level of detail this study will additionally explore opening and closing leadership behaviors across the whole process, without taking into account specific process

stages. This third level is implemented based on the current assumption that creativity and implementation cannot be separated at all and thus requires a regular switching between leadership behaviors in an unpredictable manner across the whole process (Rosing et al., 2011).

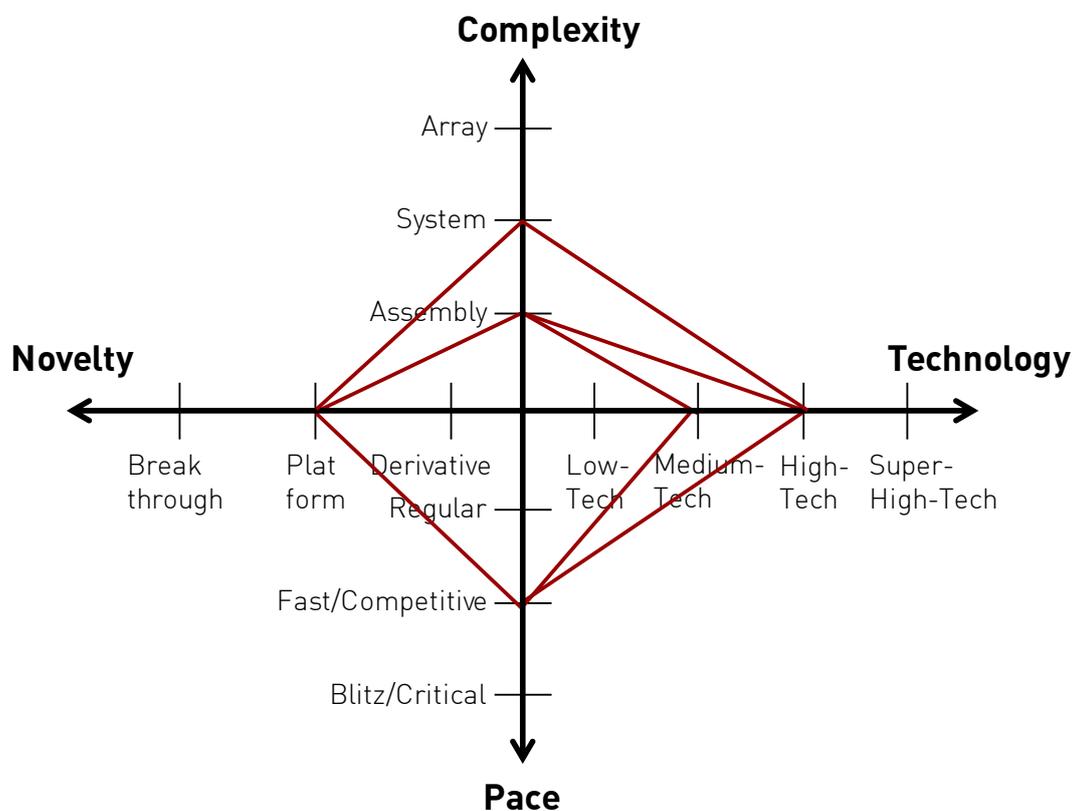


**Figure 9: Overview of different levels of detail for the exploration of opening and closing leadership behaviors**

Since innovation projects can differ widely in their characteristics, the possible scope of projects for this study was limited. In this regard, a standard type project was defined together with Rosing (personal communication, 2014) based on the NCTP framework developed by Shenhar and Dvir (2013). The model is based on studies which have been conducted with the objective to identify key characteristics of a project with impact on project management behaviors (Lewis et al., 2002; Payne & Turner, 1999; Shenhar, 2001). As a result, the NCTP framework

distinguishes projects along the dimensions: novelty, complexity, technology and pace (Shenhar & Dvir, 2013) (see figure 10).

First, product novelty is defined as the “perceived newness of a product to its potential users” (Shenhar & Dvir, 2013, p. 1271). The dimension distinguishes between derivative products, platform, and breakthrough products. Derivative products, refer to product line extensions, platform products are new generations of existing product families, and breakthrough innovations are new to the world products. Platform innovations were chosen as the most suitable type of project which best fit the full Stage-Gate model (Cooper, 2008).



**Figure 10: The NCTP framework (adapted from Shenhar & Dvir, 2013)**

Secondly, the dimension of technology (technological complexity) represents the major source of project uncertainty. Shenhar and Dvir (2013) distinguish between low technological uncertainty projects with focus on mature technologies. Medium technological uncertainty project are often based on existing technologies but incorporate additional features with partially new technologies. High technology projects deal with first integrations of technologies which are mostly

new but existing at the project start. Finally, super high technology projects are based on new technologies which do not yet exist at the project beginning. As the most suitable case including a sufficient degree of complexity, medium- and high-tech projects were targeted.

In terms of project complexity, the model distinguishes assembly projects which combine components or modules to a single unit with a single function. System projects refer to more complex projects including multiple sub-projects dealt with by in-house and external subcontractors. Array projects are large-scale projects dealing with dispersed systems which together achieve a common purpose. This study focuses on assembly and system projects.

Finally, projects can differ in pace. Regular projects are not time critical and initiated to achieve long-term goals. Fast-competitive projects are most frequently carried out by profit-oriented companies to meet current market opportunities. Critical-blitz projects are the most time-critical projects. This study will focus on fast-competitive projects.

In summary, this study considers three different Stage-Gate generations according to which companies are assumed to organize their innovation processes. Moreover, the dynamics of opening and closing leadership behaviors will be explored on three different levels of detail (i.e. stage-specific, beginning-end comparison, overall process). In order to reduce the possible project complexity the NCTP framework was used. Taken together, the theoretical model for the exploration of opening and closing leadership behaviors consists of three levels of detail with each level considering three different Stage-Gate generations (see figure 11). Opening and closing behaviors provided by Rosing et al. (2011) will serve as initial examples (see table 1 in chapter 2.2.3).

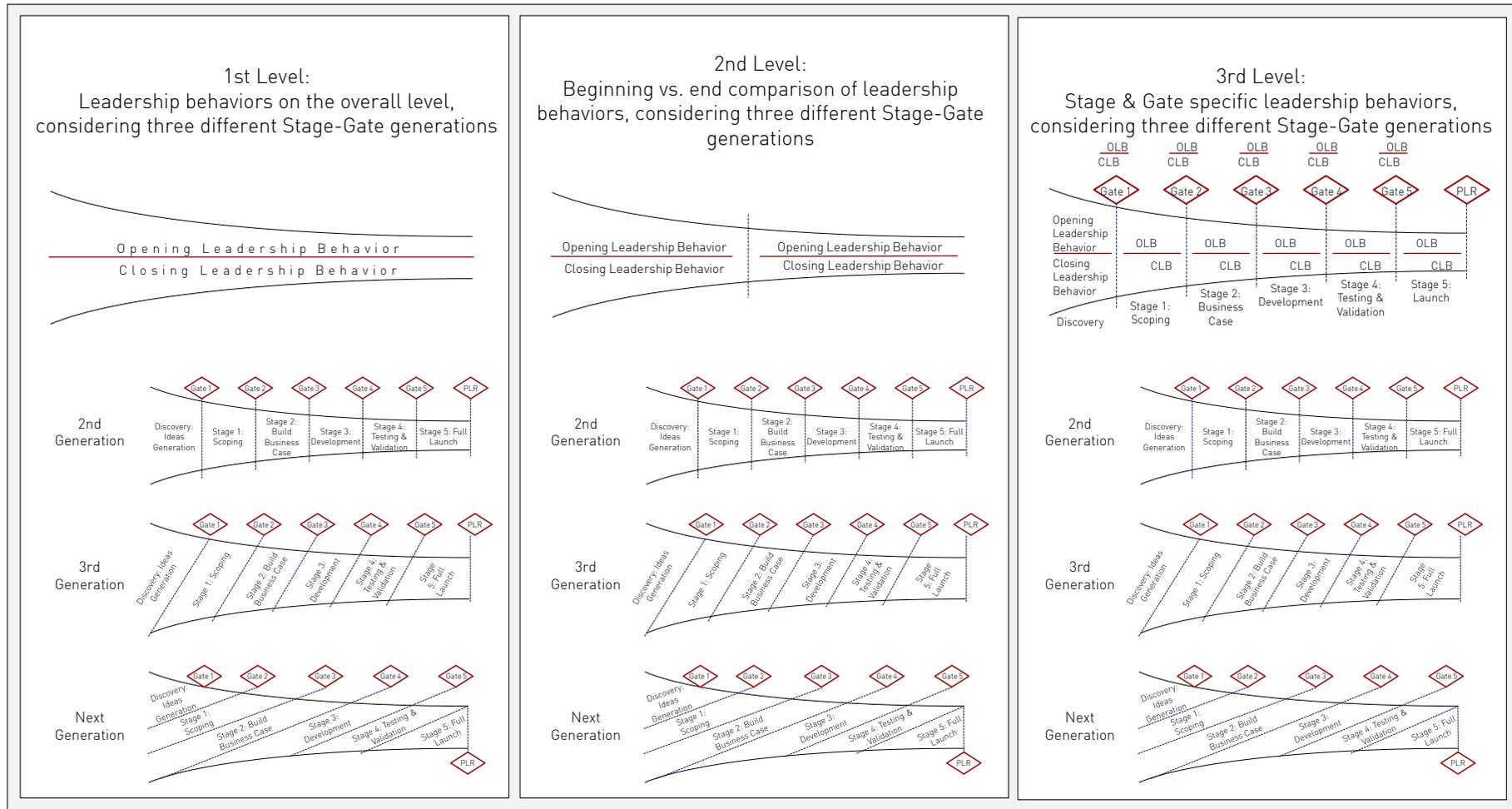


Figure 11: Theoretical model for the exploration of opening and closing leadership behaviors along the Stage-Gate innovation process

## 3 METHODOLOGY

The following chapter 3 covers the methodology. In order to understand the researcher's perspective, the chapter starts with the applied research method. This covers the reasons behind the chosen qualitative research design and the selection of a phenomenological approach. Afterwards, the data collection and sampling methods are explained by which the research is conducted. Following that, the interview design is outlined which is important for the understanding of the subsequent analysis process and the presentation of results chapter. Due to the application of a template analysis, chapter 3.4 puts special emphasis on this relatively new technique for the analysis of qualitative interviews.

### 3.1 RESEARCH METHOD

Even though the idea to apply the concept of ambidexterity to the individual level is not completely new (Probst et al., 2011), Rosing et al. (2011) are the first who propose a theoretical model of ambidextrous leadership for innovation leaders. In this regard, just recently a first study provided initial support for their theoretical model (Zacher & Rosing, 2014). However, Rosing and colleagues identify various possibilities for future research, which first of all target the further development of the existing model. Thus, this research responds to the call for more detailed insights about the phenomena of opening and closing leadership behaviors. To further develop ambidextrous leadership theory, this study strives for in-depth information in order to receive more detailed insights about project managers' leadership behavior. In those cases Creswell and John (2013) propose a qualitative research.

Based on the decision to conduct a qualitative study, a phenomenological approach was identified to best suit the intended research. Phenomenological studies ask the researcher to set aside pre-existing experiences with the research topic in order to take a fresh perspective on the phenomena (Creswell, 2013). In this way, the researcher is able to describe the shared experiences of project managers which are leading new product development teams within the

innovation process in order to further develop the existing but relatively nascent model.

### **3.2 DATA COLLECTION AND SAMPLING**

According to Creswell (2013) interviews are the most common form of data gathering in qualitative research and especially suite phenomenological studies. More precisely, it was decided to conduct semi-structured qualitative interviews (Creswell, 2008). Following Rosing et al. (2011) every project manager who leads innovation teams within new product development processes which follow the Stage-Gate model was considered a potential participant for this study. Since Stage-Gate focuses on product developing companies, manufacturing companies were selected. Within manufacturing companies, the focus was set towards development projects in contrast to research projects, since both types are often separated within companies (Elkins & Keller, 2003).

In order to directly connect to manufacturing companies with internal development processes which follow Stage-Gate, the researcher visited the “connecticum” job fair. It is one of the biggest job fairs worldwide and takes place in Berlin once a year. After initial investigations about the companies, the researcher spoke to human resource managers from 84 of the 400 companies within three days in order to identify potential participants and receive feedback on the research topic. 41 companies have been identified to apply the Stage-Gate model for their product developing process. Right after the job fair, the human resource managers were contacted via email including a short description of the topic, a small curriculum vitae and the request to get directly connected to a project leader (see appendix I). From the 41 companies, nine project leaders agreed to participate in an interview. Based on public data from the Chamber of Industry and Commerce, additional manufacturing companies were contacted via telephone, whereby six additional project leaders agreed to participate in the present research. With 15 interviews in total, this study is based on a non-probability purposive sampling as defined by Blumberg, Cooper, and

Schindler (2008). The table below provides an overview about the participating companies, the participants' job positions as well as the respective industry (see table 2). In total 15 project leaders have been interviewed, which can be considered a reasonable size for a phenomenological study (Creswell, 2013). Participants had 13 years of project management experience on average, ranging between two and 33 years. Experiences with the Stage-Gate process ranged between two and 20 years, with an average of 10 years. The average project duration was three years, ranging between six month and 10 years. Results are based on 12 German, one Swiss and two Swedish project leaders. As depicted in the table 2, those companies covered software and hardware developments. For a more detailed overview, appendix V provides additional information about each interview. The group was predominantly composed of men, with 7% women. For reasons of simplification and confidentiality, this study does therefore not distinguish between masculine and feminine project leaders during the subsequent chapters. Theoretical saturation was reached after conducting around two third of the interviews. The additional interviews strengthened existing results without adding much information about the leadership activities within the innovation process (Creswell, 2013).

**Table 2: List of participating companies, job positions of interviewees and the respective industry**

<b>Company</b>	<b>Position</b>	<b>Industry</b>
BMW AG	Project Manager, Driver Assistance Systems	Automotive
Cortado AG	Project Manager, Software Development	IT Services
Flexlink AB	Project Manager, Product & Supply Division	Conveyor Systems
Flexlink AB	Project Manager, Business Development	Conveyor Systems
Freudenberg KG	Head of Innovation & Technology Development	Housewares and cleaning products, automobile parts, textiles, building materials, and telecommunications
Hapa AG	Head of Mechanical Engineering	Packaging Systems
iav GmbH	Project Management PO	Automotive
Laetus GmbH	Director R&D Standard Systems	Packaging Control Systems

### 3 Methodology

Omicron GmbH	Chief Executive Officer	Measurement Devices
PMCS GmbH & Co. KG	Head of Research & Development	IT & Data management
Rohde & Schwarz GmbH & Co. KG	Project Manager, Test & Measurement	Communication Systems
Schott AG	Corporate Business Development	Glass manufacturing
Sirona GmbH	Project Manager, Imaging Systems	Medical engineering
Still GmbH	Head of New Development	Intralogistics
Volvo Group AG	Chief Project Manager, Wheeled Excavators	Automotive

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Before the interview, participants were asked to refer to one of their projects which match the pre-developed project characteristics of the NCTP framework developed in chapter 2.3 (also see appendix II) and focus on their leadership behaviors with regard to this specific project. The same email included the interview guideline (see appendix III) as well as the interview consent (see appendix IV) including information about the interview such as the topic, duration, recording, contact information of the supervisors, the advice about voluntariness and confidentiality. The study consent was signed by each interviewee who confirmed the mutual agreement to the terms of the study.

12 of 15 interviews were conducted per telephone, two face-to-face. Interviews lasted approximately one hour. In addition to the audio recording, the researcher took careful notes to increase accuracy. Each interview started with a short introduction regarding the purpose of the study. Participants were asked for their permission to record. At the end of the interview the researcher thanked all participants and asked for feedback and some final thoughts. The interviews were personally transcribed using the software F4 5.2 which resulted in documents averaging about 13 pages of single-spaced text. The format of the transcripts follow the rule system developed by Kuckartz (2008). All transcriptions were reviewed and compared against the notes. As a reward for participation each interviewee received an executive summary including some background information and the results.

### **3.3 INTERVIEW DESIGN**

The interview guide was created following King's instructions about semi-structured interviews (King in Cassell & Symon, 2004). The guideline was divided into six major sections comprising 20 questions (see appendix III). The initial interview guide was based on existing literature about ambidextrous leadership theory, personal conversations with Rosing and was further modified through its use during the interviews. The questions focused on leadership behaviors with regard to the leader-follower relation on different levels of the innovation process. Over the course of the interview, the questions increased in terms of focus from general leadership behaviors to stage and gate specific behaviors. To ensure comparability of German and English interview guidelines, the English translation was reviewed by a bilingual speaker.

During the introduction section, some general information about the interviewee such as the project management and Stage-Gate experience was gathered as well as a rough description of the individual Stage-Gate process. The information enabled its allocation to one of the three considered process generations based on the major indicators provided by Cooper (1994; 2014). The second section covered the project manager's general perception of his leadership style and leadership differences between the beginning and the end of the innovation process with regard to the project team. The third section explored the leader-follower relations within every single stage of the process. Section four focused on the question if leaders do intentionally or unintentionally switch between opening and closing leadership behaviors along the process and within certain stages. Sections two, three and four thereby intended to explore the three major aspects of ambidextrous leadership on different process levels: opening and closing leadership behaviors and the flexibility to switch between the two of them (Rosing et al., 2011). Within section five, the researcher changed the perspective compared to the section before. Based on the existing examples of opening and closing leadership behaviors (see table 1 in chapter 2.1.2), a random list of behaviors was presented to the project leaders. Interviewees were asked not to read through this last page of the interview in advance. During this

section project leaders evaluated the relevance of the examples in general, their overall importance, and their relevance for certain stages or gates. Moreover, the interviewer asked for additional examples of important leadership behaviors. During the data analysis, the answers of section six were compared to the answers of all former parts and served as probes for the coding process. Finally, an open question at the end of the interview, part six, intended to gain an understanding about innovation performance and what interviewees regarded to be generally relevant for project success.

### **3.4 ANALYSIS**

According to Moustakas (1995), phenomenological studies focus on the analysis of significant statements, the creation of meaning units and the identification of the essence description of the explored phenomena. This study applies a template analysis, developed by Nigel King as an approach to phenomenological studies which lies between the common top down the bottom up approach. Especially when working with already existing codes, the technique provides a good structure towards qualitative data analysis (King in Cassell & Symon, 2004). Its application is outlined in the following before the further analysis process is presented.

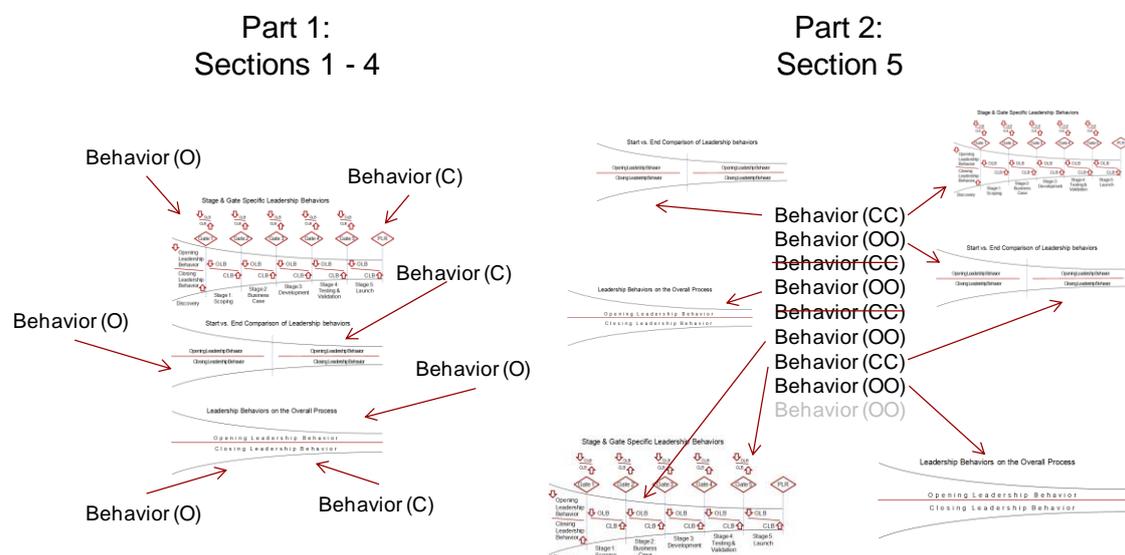
#### **3.4.1 Application of Template Analysis**

According to King (2004) template analysis can be used for realists qualitative research which account for the positivistic position of qualitative social sciences as well as for contextual constructivists. Following Moustaka's (1995) transcendental phenomenology, the epistemological position of this research is also phenomenological. Accordingly, interview answers are interpreted as being partially influenced by the interview context, but generally reflecting the subjective impressions of the participants' life-world (Cassell & Symon, 2004). Applying template analysis within a phenomenological approach is in practice relatively similar to interpretative phenomenological analysis (IPA) (Smith, 1996). However, template analysis was considered to better suit the research goal due to the

possibility to work with a-priori codes. Moreover, IPA is rather focusing on within case analyses with a smaller sample of 10 participants or less, while template analysis is balancing within and between case analyses and is able to handle larger sample sizes (Cassell & Symon, 2004). This was considered to be another advantage since opening and closing behaviors were not only studied within Stage-Gate, but also between different generations of Stage-Gate models.

For the initial template, a-priori codes were derived from the interview topic guide which was based on academic literature of ambidextrous leadership, including the existing examples of opening and closing behaviors, and personal conversations with Rosing (Cassell & Symon, 2004, p. 259). To create a hierarchical structure, the examples of opening and closing behaviors were attached to different higher-order codes: the most general category was “overall leadership behaviors along Stage-Gate”. This category applied to opening and closing behaviors which were shown independently of the process stage. On a more detailed level, it was distinguished between behaviors shown at the beginning of the process and at the end (“start-end-comparison of leadership behaviors”). Finally, opening and closing behaviors were analyzed within every single stage of the process (“stage specific ambidextrous leadership behaviors”) and before and after gate meetings (gate specific leadership behaviors). Moreover, the types of Stage-Gate processes were distinguished (“Stage-Gate generation”) and some information about the participants and the individual process of the participating company were included into the coding process. The template was then further developed and modified during the interviews and the analysis using measures of insertion, changing scope, and deletion proposed by King (2004). Additional codes were *inserted* when actions of opening and closing behavior described by the interviewee could not be matched to the existing set of codes (e.g. “emphasize a loose system of rules”). Changing scope took place when codes were too narrowly defined (e.g. “establishing routines” was refined to “establishing rules and routines” as a counterpart to the existing code of “controlling adherence of rules and routines”). None of the pre-existing codes was deleted in this study.

The final template can be found in the appendix VI. It also distinguishes between opening and closing behaviors coded during the first and the second part of the interview (see figure 12). The first part generally refers to sections one until four in which participants described their behaviors without any guidance. This first part is indicated by the letters “O” for opening and “C” closing. Section five will later on be referred to as part two in which the participants were asked to give their opinion about the list of the pre-existing leadership behaviors. Those results are indicated in the template with “OO” and “CC”. The resulting template consists of six higher-order codes and up to three levels of sub-codes. As proposed by King, analysis software was chosen in order to better organize the coding process.



**Figure 12: Two parts of the interview following two different approaches**

### 3.4.2 Analysis Process

The analysis already started during the data gathering process in order to improve the questionnaire for the subsequent interviews and increase the understanding for the topic (Meuser & Nagel, 2002). Despite its interactive character, data analysis generally followed the process provided by Creswell (2008). Initially the interviews were transcribed and read through in order to receive a general impression about the gathered information. Afterwards the different sections of the interview were labeled (e.g. start-end comparison of leadership behaviors, stage-specific leadership behaviors, etc.) and the topics spoken about within

each section were identified (e.g. scoping, business case, start of project, etc.). Next, different leadership behaviors were identified and categorized within the initial template of opening and closing leadership behaviors, which evolved during the process as described above. Additional examples of opening and closing behaviors were created when the researcher was not able to allocate the behaviors to the existing clusters. The resulting bundles of different behaviors allocated to the different examples of opening and closing leadership were analyzed and grouped when they were barely distinguishable. In that way, the number of opening and closing behaviors could again be reduced. In addition to the analysis of opening and closing behaviors, statements with relevance to the context were coded and clustered into different categories.

The software Atlas.ti 7.5 was used to categorize, analyze and store the interviews. In this regard, four companies were identified to apply 2<sup>nd</sup> generation Stage-Gate processes, six worked with 3<sup>rd</sup> generation processes, and five with next generation processes. In addition, memos were used for example to note additional information and make further descriptions of people or the setting of the interview. Using the analysis software, the researcher was able to evaluate the data for example by using the query and co-occurrence tools. The grouping of memos, codes and documents additionally eased the analysis process and allowed for hierarchical structuring (e.g. interviews allocated within a certain Stage-Gate generation). The following table provides an overview about the coding scheme consisting of existing and new items of opening and closing leadership behaviors including their description and a typical example from the interviews (see table 3 and table 4). Pre-existing codes which have been modified during the study are indicated by the abbreviation "mod". Additional codes are indicated by the abbreviation "new". Existing codes are not explicitly indicated.

**Table 3: Coding scheme for opening leadership behaviors**

<b>Code</b>	<b>Opening item</b>	<b>Description</b>	<b>Example</b>
<b>01</b>	Allowing different ways of accomplishing a task	Intentionally prevent the specification of tasks in advance and ask the team to find their own way of accomplishing a task	"But that I determine the way how to reach the goal by saying: You have to do it exactly this way. We don't do that!" (Interview, July 31, 2014, 133, author's translation)
<b>02</b>	Allowing errors	Accept that error making is natural in innovation processes	"Error making is natural. However, you should not make the same error twice" (Interview, July 31, 2014, 079, author's translation)
<b>03 (new)</b>	Being flexible on planning	Being open for changing plans if necessary	"We are not very strictly following the plan. But of course we have it as a guideline. And it is important." (Interview, August 19, 2014, 178)
<b>04 (new)</b>	Being open for discussion	Welcome discussions within team and between project leader and the team members	"I encouraged my team to discuss the further procedure together with me" (Interview, July 31, 2014, 050, author's translation)
<b>05 (new)</b>	Emphasize a loose system of rules	Keep amount of rules as small as possible	"Well, of course there are synchronization-points where I am in regular contact with my team. However, usually we get along with only few regulations. This only changes in later stages." (Interview, August 9, 2014, 036, author's translation)
<b>06 (new)</b>	Enable the team to work more creatively	Support team with tools, resources to encourage creativity	"However, of course we made available the necessary resources. But since we needed the creativity of the team we allowed a high freedom of action with regard to the realization." (Interview, July 31, 2014, 038, author's translation)
<b>07 (new)</b>	Encourage exchange of information	Support the exchange of information among team members and other parties	"Something which is quite important to me is that my team takes a look outside the box, and takes other parties into account which could be affected and talk to those. In this respect, I encourage the communication with others (...)." (Interview, August 9, 2014, 182, author's translation)
<b>08 (new)</b>	Encourage self dependent task accomplishment	Encourage team to solve issues on their own	"What is very important to me is that my team works autonomously and self dependently on their tasks so I am not engaged into micro management." (Interview, July 31, 2014, 148, author's translation)
<b>09</b>	Encouraging error learning	Encourage the individual or the whole team to learn from errors	"(...) I encourage visualizing mistakes in order to reach a learning progress for the whole team." (Interview, July 31, 2014, 079, author's translation)

<b>010</b>	Encouraging experimentation with different ideas	Profit from the creative capacity of the team and support the experimenting with different ideas	“Stage two is a quite creative stage. In this context, we need to explore the technical feasibility, make experiments with different ideas and approach different alternatives asking what does the customer really need?” (Interview, July 31, 2014, 053, author’s translation)
<b>011 (new)</b>	Give regular feedback to the development team	Foster a one-sided provision of feedback without making own decisions	“But rather in the way that I express my opinion about how I think it should be. However, I do not force the team to take this direction.” (Interview, August 15, 2014, 108, author’s translation)
<b>012</b>	Giving possibilities for independent thinking and acting	Thinking and acting is possible during project (based on the initial idea)	“You simply have more flexibility. You are thinking in different directions, and the team tries out different directions about how to realize the idea.” (Interview, August 6, 2014, 090, author’s translation)
<b>013</b>	Giving room for own ideas	Giving the possibility for team members to bring in own ideas	“We always try to provide the greatest freedom of action with regard to the HOW specifications are implemented, in order to include the developer’s own creativity.” (Interview, July 31, 2014, 067, author’s translation)
<b>014 (new)</b>	Initiate problem solving process by questioning	Stimulate team creativity by asking questions	“So there I start to ask questions, like coaching. I can ask so if we do it like that or if we do it like that. (...) I start to ask questions so maybe they come to the conclusion.” (Interview, August 21, 2014, 048)
<b>015</b>	Motivate to take risks	Encourage risk taking	“So we take some risks in this stage. And we leave some designers to work with a little bit wild ideas and so on. So I am not braking or stop things here very much.” (Interview, August 19, 2014, 074)
<b>016 (new)</b>	Promote a vision to increase problem-solving capacity	Promote a vision about the final product to encourage the problem solving capacity of the team	“In my opinion, motivation results especially from creating enthusiasm about the final product. (...) I try to motivate my team by talking about the size of our booth at the next fair and about how many of the planned features will be presented to our customers. When problems arise such measures are much more effective because the team can image the final product (...).” (Interview, August 15, 2014, 074, author’s translation)

**Table 4: Coding scheme for closing leadership behaviors**

Code	Opening item	Description	Example
<b>C1 (new)</b>	Allocate tasks	Split up the whole project into packages and divide up the tasks among team members	"This is different during the development stage. Here the project is split up into very precise working packages which simply need to be executed without expanding single activities. (Interview, August 9, 2014, 122, author's translation)
<b>C2 (mod)</b>	Controlling adherence of rules and routines	Control formerly established rules and routines with regard to the task and behavioral codes	"Sticking to rules is quite important to us: Adhere to the guidelines, how to do the testing, when to hand in which reports and so on." (Interview, August 6, 2014, 276, author's translation)
<b>C3 (new)</b>	Determine task completion	Prevent over engineering by actively stopping developments at a certain point	"I see that we could do a lot better. However, I define this to be sufficient and complete; simply because there are other things to do which need to be done." (Interview, August 9, 2014, 084, author's translation)
<b>C4 (mod)</b>	Establishing rules and routines	Define a structured way of doing things and provide the team with tools to follow rules and routines	"[...] to establish the rules of the game. In particular, how to exchange documents? How to do the versioning? Where to deposit things? All those rules are established." (Interview, August 1, 2014, 062, author's translation)
<b>C5 (new)</b>	Increasing pressure on team members	The project leader is acting very demanding towards the team (e.g. increasing presence, asking questions, requesting documents)	"And the testing stage is more about a continuous controlling of the team progress. Contact increases in this stage and I visit the team regularly during the day to see how things are." (Interview, August 13, 2014, 098, author's translation)
<b>C6</b>	Monitoring and controlling goal attainment	Monitoring and controlling the advancement of the project, especially with regard to timetables, costs and quality	"For me it is very much to securing the timetables. That they are followed. (...) Have the launch on time and within the cost frame and so on." (Interview, August 19, 2014, 060)
<b>C7</b>	Sanctioning errors	Punish error making	"(...) I mean when errors occur due to careless behavior. Such errors are not tolerated. This must not happen" (Interview, July 31, 2014, 085, author's translation)
<b>C8 (new)</b>	Setting the project scope	Define and communicate the existing borders of the project	"We initiated a workshop in which we specified the objective of this project very precisely. We provided the technology to be used and then approached the development team and asked how to realize the project based on this specific technology." (Interview, July 31, 2014, 036, author's translation)

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<b>C9</b>	Sticking to plans	Hold on to an existing plan without the intention to modify	"Sticking to a plan. YES, those are golden to me! Plans we have made together (...) those need to be followed!" (Interview, August 15, 2014, 149, author's translation)
<b>C10</b>	Taking corrective action	Actively interfere into the project. For example by deciding how to continue project or resolve disagreements within the team	"When you realize problems, for example in cases where single team members are overburdened with their task, or dissipate their energies, in such cases a project leader needs to tighten his leadership style." (Interview, July 31, 2014, 117, author's translation)
<b>C11</b>	Paying attention to uniform task accomplishment	Insist on a homogeneous execution of tasks	"Because in our industry there are many regulations about how to document, how to execute tasks, and which tools are allowed to use. This is very important during the whole process." (Interview, August 6, 2014, 250, author's translation)

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## 4 RESULTS

The following chapter presents the research findings within three blocks which follows the structure of the theoretical model develop in chapter 2.3. In this regard, chapter 4.1 covers the results with regard to the overall level. Those findings comprise opening and closing leadership behaviors which were found to be constantly present and not attributable to specific sections of the innovation process. Afterwards, the dynamics of opening and closing leadership around gate meetings are presented on the overall level within the same chapter, since this research does not distinguish between earlier or later gate meetings during the process. On the second level of detail, chapter 4.2 contrasts opening and closing leadership behaviors, comparing them at the beginning and at the end of the innovation process. Finally, on the third and most detailed level of analysis, chapter 4.3 describes the dynamics of opening and closing leadership behaviors within each stage of the product development process. Differences between Stage-Gate generations are emphasized though the whole results chapter where appropriate. Opening and closing leadership behaviors are indicated by the letter O (opening) respectively C (closing) and the reference number indicated in table 3 and table 4 in chapter 3.4.2.

### **4.1 OPENING AND CLOSING LEADERSHIP BEHAVIORS ON THE OVERALL LEVEL**

The structure of chapter 4.1 follows the three dimensions emphasized by the model of ambidextrous leadership (Rosing et al., 2011), namely opening behaviors, closing behaviors, and the switching between both. In this regard, results with regard to single leadership items (opening and closing) are presented first. Secondly, statements which emphasize the combined presence of opening and closing leadership items are covered which represent the flexible switching between both behaviors. Third, distinctions between leadership behaviors in different Stage-Gate process generations are shown.

## **Results focusing on single items of opening and closing leadership**

With regard to single opening and closing leadership items, encouraging self depending task accomplishment (O8), giving possibilities for independent thinking and acting (O12), being open for discussions (O4) and enabling the team to work more creative (O6) by providing tools and resources, were most often mentioned with regard to opening leadership behaviors. In terms of closing behaviors, sticking to plans (C9) and taking corrective action (C10) have been regarded as being most important through the whole project. Opening and closing leadership behaviors were often found to be simultaneously present during the project:

*“Monitoring and controlling goal attainment, yes, but rather on the overall level, not on the micro-level. I expect the employee to have a good self-control and the team to have a good self-control over their tasks. This behavior is constant along the whole process.”* (Interview, July 31, 2014, 137, author's translation).

Later on he continued: *“Taking corrective action? Yes, when I recognize that a project is in danger. However, I do not intervene if I have the feeling that I would choose a different way of implementation compared to the team. Thus, it is rather situational.”* (Interview, July 31, 2014, 157, author's translation).

Closing behaviors became more relevant over time until decreasing in the last stage of the process. In this respect, sticking to plans (C9) was mentioned most often to be relevant during the whole process. This item was particularly crucial during the stage of testing and validation, and in general more relevant in large-scale project than in small-scale projects. Even though plans were adapted over time, the currently valid plan had to be followed:

*“Sticking to plans? YES, those are golden to me! Plans we have made together – but this is only my opinion – those need to be followed!”* (Interview, August 15, 2014, 149, author's translation).

However, project leaders generally focused on opening behaviors more than closing behaviors. Moreover, closing behaviors have often been regarded as not appropriate in the innovation context. Sanctioning errors (C7) was the most obvious example of closing leadership in this regard. During the interview respondents explained that they would always prevent error sanctioning if possible:

*“Sanctioning? Do you mean that you punch someone? NO! That is not a good way of developing people.”* (Interview, August 19, 2014, 170)

Another interviewee added: *“Sanctioning errors. I would say this is not really productive.”* (Interview, August 19, 2014, 124)

In most cases, project leaders did not have the competence to personally sanction errors and were only able to escalate problems over several hierarchies within the company. Instead of sanctioning, errors were usually allowed (O2) and error learning was encouraged across the whole team (O9) in order to reach long-term prevention:

*“Errors are tolerated, when an error occurred because it was unknown. But errors, which should have been known, because they belong to someone’s special field, those are not tolerated. In this regard, the strategy is to establish a culture of proactive feedback. (...) But always focused on the issue and respectful.”* (Interview, July 31, 2014, 179)

Later on the project leader emphasized the overall importance of the item: *„This is important during the whole process and beyond the scope of an individual.”* (Interview, July 31, 2014, 183, author’s translation)

Time pressure was regularly mentioned to be one of the main indicators for the increase of closing leadership behaviors. However, any time when errors occurred during the project leaders had to decide when to pull out the team or sin-

gle individuals from their daily routines in order to provide the space to explore the problem at hand:

*“For example, even though time pressure increases, we always need to give room for creativity when a project gets stuck. But as soon as a solution is identified, we make a decision and then continue working within the schedule. But I cannot say that such behavior would be specific to a certain project stage.”* (Interview, July 31, 2014, 129, author's translation)

### **Results focusing on multiple items of opening and closing leadership**

In terms of findings, which emphasized both opening and closing leadership behaviors, most project leaders shared the opinion that the team and not the manager is the major source for innovation. In this regard, opening behaviors were shown to provide the greatest possible freedom of action to the followers (O8). At the same time, closing behaviors established the borders in which the team was able to explore (C6):

*“The amount of graduates is almost 100% including a lot of employees with a doctor's degree. They are all specialists. There my premise was confirmed so far that the team does usually know quite well how to efficiently solve a problem at hand. So I try to leave the freedom of action as large as possible while managing the formal stuff as “lean” as possible.”* (Interview, August 9, 2014, 200, author's translation)

After the product functions have been specified in the early stage of the process, in most instances project leaders did not interfere in the way how the product specification were realized by the product developers (O1). Instead, opening behaviors encouraged the team to solve tasks autonomously within the existing constraints in terms of time, costs and quality (C6):

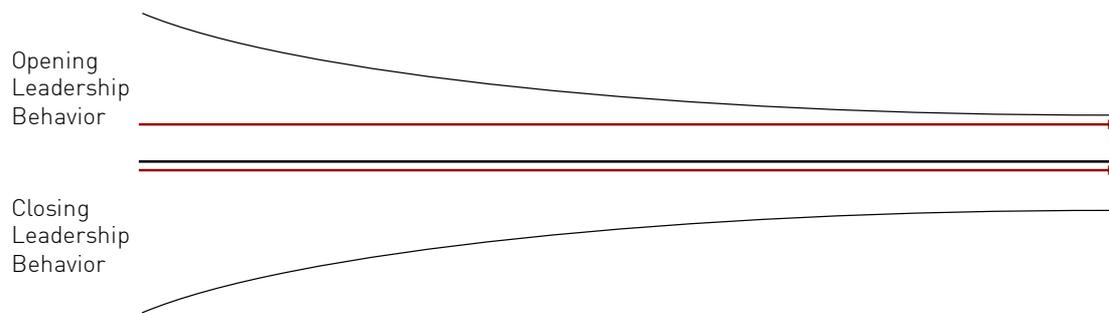
*“The product manager defines WHAT we want to achieve. Afterwards the project leader has the responsibility to keep the project within the cost- and timeframe, and ensure the development of the product specifications. In this regard, I always try to keep the freedom of action as high as possible in order to ensure that the creativity of each developer unfolds within the project.”* (Interview, July 31, 2014, 067, author's translation)

An interesting finding was that even though project leaders have been found to regularly switch between opening and closing leadership behaviors over the course of the innovation process, they described their leadership behavior to be constant:

*“I would say that my leadership style is rather constant in the way that I try to show situational behaviors. (...) Thus, as directive as necessary and as free as possible. I mean that changes depending on the respective innovation requirement. (...) So that I try to adapt my leadership style to different situations - I would call this constant. (...) Because I do not see that such behaviors would change during different phases of the project.”* (Interview, August 9, 2014, 142, author's translation)

Another project leader added: *„A conscious adaption of leadership, in the way that I increase or decrease certain behaviors, is not the case.”* (Interview, August 12, 2014, 108, author's translation)

The resulting model depicted below shows the general emphasis on opening leadership behaviors, while closing leadership behaviors were found to be less relevant (see figure 13).



**Figure 13: Opening and closing leadership behaviors on the overall level indicating the focus on opening leadership behaviors through the innovation process**

### **Result focusing on differences of opening and closing leadership behaviors between different Stage-Gate generations**

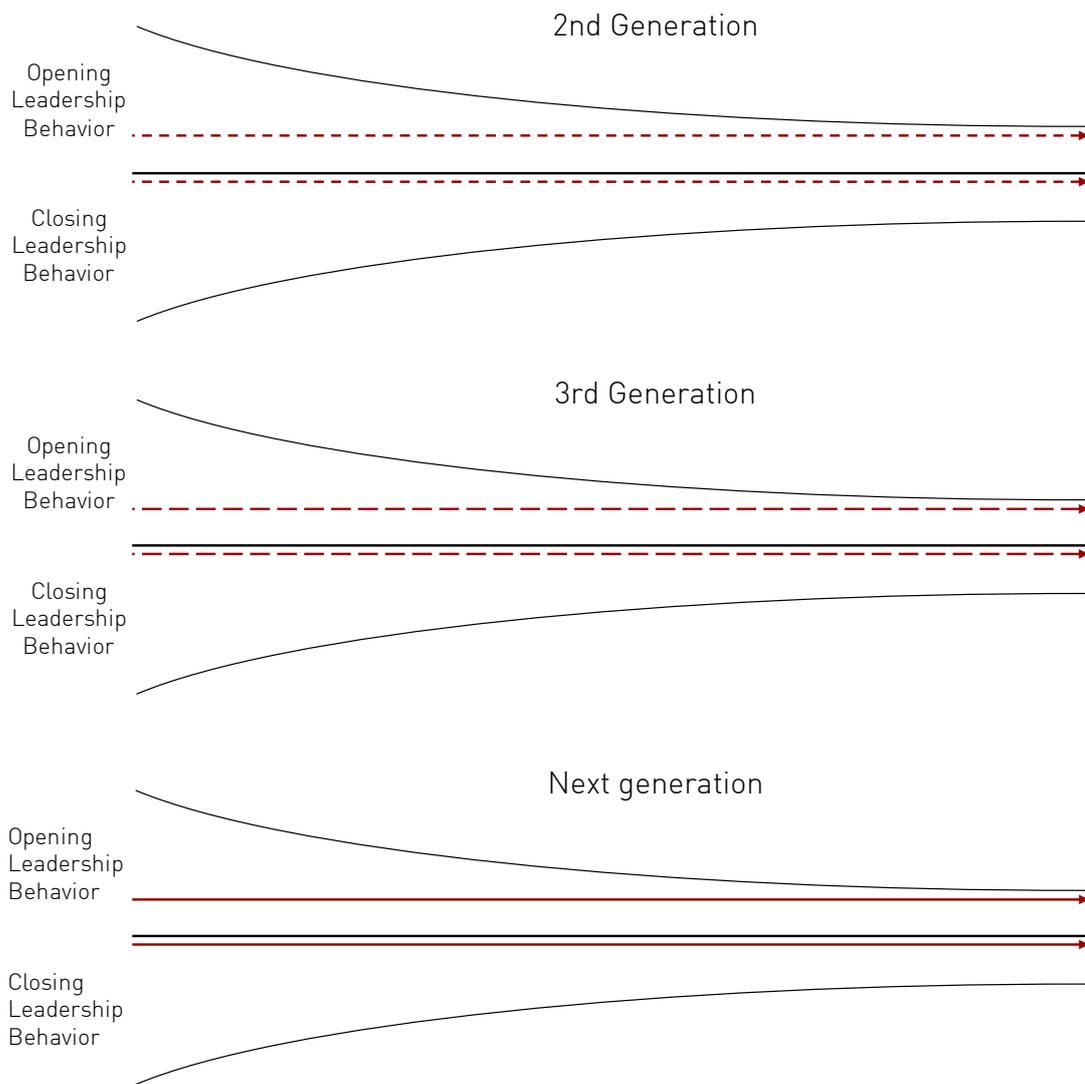
During the analysis different characteristics of Stage-Gate generations have been described according to which interviews were categorized. Guided by the existing examples of opening and closing leadership, participants were asked to allocate opening and closing leadership behaviors across three different levels (overall, beginning vs. end of process, stage specific). The most noticeable finding in this area has been that while project managers leading 2<sup>nd</sup> generation processes found it relatively easy to identify stage-specific behaviors, managers of 3<sup>rd</sup> generations rather spoke of the beginning and end of a process, and project leaders of next generation processes have been least able to relate their behaviors to certain project stages. Instead, next generation leaders spoke primarily about different intensities of opening and closing behaviors on the overall process level. This finding was also supported by answers given during the second part of the interview. Figure 14 therefore indicates the increasing tendency over generations to attribute items to the overall process level.

Another finding was that the relevance of opening behaviors increased with later Stage-Gate generation. Project leaders increasingly managed the project on an overall level by determining the overall target but leaving the technical solution to the development team(s):

*“At the beginning of the project I roughly present the feature and I provide the specifications to the project team. But the team is generally free in the way of implementing the feature.”* (Interview, August 13, 2014, 038, author's translation).

A next generation project leader summed up how he was balancing leadership behaviors by establishing and controlling a clear system of rules (C2, C4), and encouraging exploration activities from his followers by giving sufficient possibilities for independent thinking and acting (O12), and room for own ideas (O13):

*“I think what you need is a quite interesting mix composed of a couple of clear rules, which do not establish boundaries with regard to the project content, and a high freedom of action with regard to the realization of this content. This is a combination of a strongly cooperative leadership style, while you need a high strictness with regard to the adherence of schedules. This is what I regard as a key criterion for success.”* (Interview, August 15, 2014, 036, author's translation)



**Figure 14: Opening and closing leadership behaviors on the overall level indicating the increasing allocation clarity of items towards the overall level**

In the following section, the dynamics of opening and closing leadership behaviors before and after gate meetings are outlined. Changes of leadership behaviors around gate meetings were analyzed on the overall level. More precisely, participants were not asked to compare differences of leadership behaviors at different gates along the innovation process.

In some interviews, leaders indicated a certain dynamic of opening and closing behaviors around gate meetings. Those leaders explained that before the gate meetings closing behaviors, such as the allocation of tasks (C1), monitoring and controlling goal attainment (C6), and the adherence to rules (C2), were empha-

sized in order to ensure a timely delivery of the needed documentation and interim results for the meeting. However, pressure on the team (C5) has only been increased when tasks were behind schedule. In contrast, after gate meetings, those leaders rather focused on opening behaviors such as giving feedback to the development team (O11) about the results of the gate meeting to encourage the development team. However, those dynamics were only shown in smaller projects:

*„Documents need to be prepared. In this respect, pressure increases before gate meetings. You have to reach this deadline until which you need to have certain things prepared. So pressure increases before the meetings and – which leads us to the next question – decreases after gate meetings.“* (Interview, August 6, 2014, 174, author's translation).

However, in general, gate meetings did not impact the leadership behavior. In this context, one project leader argued that, in contrast to small projects, especially in larger innovations projects, the application of controlling instruments and the regular review meetings prevent the adaption of leadership behavior before or after gates:

*“I would say our leadership style stays the same. I could have a gate meeting every day because I always know exactly where we are in the project, what is processed at the moment, and what needs to be delivered.“* (Interview, August 15, 2014, 092, author's translation)

Another project leader added: *“There are also smaller projects where you do not have such regular review meetings in between the gate meetings. And then we often have the case that pressure needs to be increased towards the project team in order to reach the promised project status. However, in large-scale projects you need those reviews among the project team in-between the gate meeting.“* (Interview, July 31, 2014, 088, author's translation)

Comparing the different generations, one finding was that project leaders who led smaller project teams within next generation processes were not involved in the project evaluation in-between the gate meetings. Instead, they empowered the team to evaluate the project status on their own during the regular review meetings:

*“This leads us again to the topic of agile development. We argue that the project leader is free to participate during such meetings. However, first of all the team is responsible for its decisions during the whole project. In this regard, I try not to impact the decision making even when I take part in such meetings. However, you always have a certain impact on the team behavior only by being present during such meetings.”* (Interview, August 15, 2014, 058, author's translation)

Since leadership behaviors before and after gate meetings only differed in rare cases, no additional model was created for the graphical represent of such findings.

#### **4.2 DYNAMICS OF OPENING AND CLOSING LEADERSHIP BEHAVIORS BETWEEN THE BEGINNING AND THE END OF THE PROCESS**

The following section focuses on the dynamics of opening and closing leadership behaviors between the beginning and the end of the innovation process. The chapter is divided into three sections. The first focuses on items of opening leadership behaviors, the second on items of closing leadership behaviors, and the third on findings with regard to different Stage-Gate generations.

The analysis revealed that the transition between the beginning and the end of the process can approximately be located within the second half of the development stage, when the focus shifts from the exploration of ideas to the imple-

mentation and timely product delivery (Farr et al., 2003). The major findings on this level of analysis is that comparing opening and closing leadership items, all participants showed a strong tendency towards opening behaviors during the beginning and focused on closing behaviors during the end of the process (see figure 15). This general finding ranged across all generations with a decreasing clarity (see figure 16).

### **Results focusing on opening leadership behaviors**

At the beginning of the project, leaders most often provided possibilities for independent thinking and acting (O12) and gave room for own ideas (O13):

*“At the beginning, the team is required to contribute actively with own ideas. They are expected to participate and think ahead.”* (Interview, August 13, 2014, 028, author's translation)

Another leader added: *“I would say at the beginning of the process you rather encourage an open and creative course of action. At the end it is rather about ticking off things where we must put our money where our mouths are.”* (Interview, July 31, 2014, 024, author's translation)

In this regard, project leaders generally agreed that the freedom given to the project team in terms of decision making (O8) is greater at the beginning, compared to the end of the process:

*“However I think that the degree of decision making is much bigger at the beginning of a project, compared to its end. That fits quite well to the funnel of the Stage-Gate process depiction.”* (Interview, August 15, 2014, 042, author's translation).

However, opening behaviors such as the openness for discussion (O4) and the initiation of the problem solving process by questioning (O14) were shown also at the end of the process in order to support fast problem identification and solving:

*„It might also be that I have learned more details along the project. I learn about the technology. I did not know many details at the beginning. So there I start to ask questions, like coaching.“* (Interview, August 21, 2014, 048)

Another leader added: *“I always give more room for own ideas when we have to solve a problem. Always when we have a problem and need an unconventional solution. Then we just need ideas. And I have to show the team that creativity is desired. Then I say: Let us brainstorm, no blinkers for now. Let us think of anything that could help. And especially in later project stages I have to encourage such behaviors.”* (Interview, September 15, 2014, 080, author's translation)

Another situation in which leaders encouraged their team to stay explorative during the project implementation was in order to generate and list ideas (O13) for follow-up projects:

*„And also later in the project I need to signal my team to become creative again. I probably won't include resulting ideas in the current project, but this creativity is required to generate ideas for follow-up projects.“* (Interview, September 4, 2014, 081, author's translation)

Finally, the majority of participants regarded the item motivate to take risks (O15) as important at the beginning of the project. However, the item was only stressed when interviewees were explicitly asked to give a statement:

*“And regarding risk management, I always try to tell them that there is also positive risks. This means that there are risks that are not only negative. So by being creative, thinking outside of the box. Especially at the beginning this is allowed. You might find solutions that you did not think of we would benefit from.” (Interview, August 21, 2014, 124)*

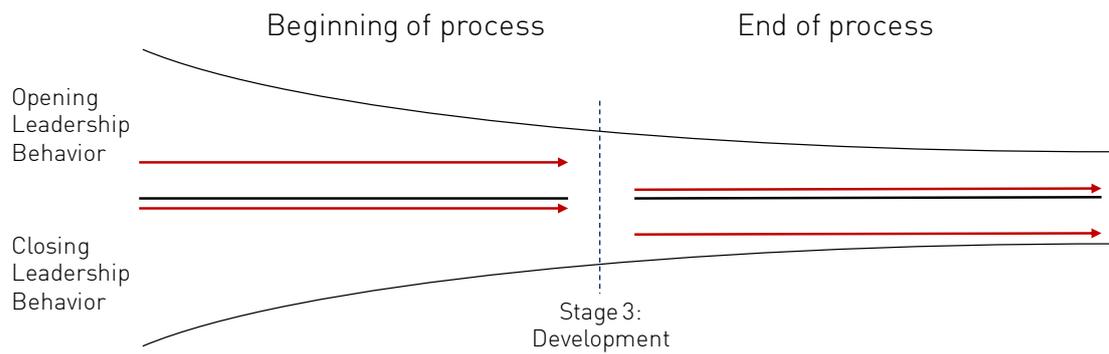
### **Results focusing on closing leadership behaviors**

Closing leadership behaviors were predominantly shown at the end of the project. In this regard, increasing pressure on team members (C5) and monitoring and controlling goal attainment (C6) were mentioned most frequently. One project leader described the end of the project as follows:

*„When coming closer to the end of a project, time pressure increases which also impacts the leadership behavior. You have to pass stricter gate meeting requirements and deadlines come closer with increasing frequency. Of course you increase the requirements towards the project team, (...) which sometimes lead to increasing pressure. You have to meet deadlines. And especially software developers need such deadlines.” (Interview, August 6, 2014, 040, author’s translation).*

However, the establishment of rules and routines (C4) was often mentioned to be relevant in the very beginning of a project. By defining rules and routines, leaders established the common basis in which the team was allowed to operate:

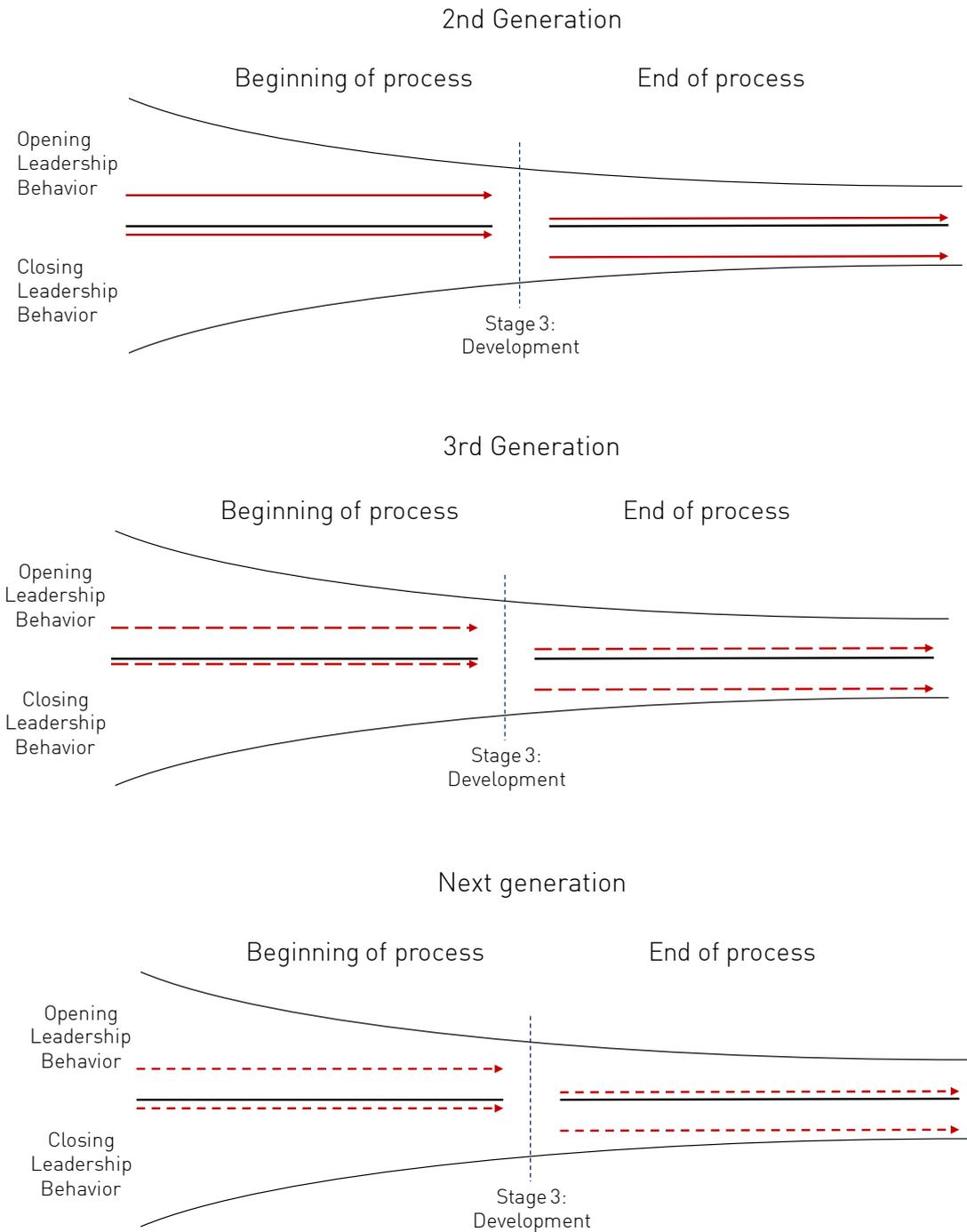
*„Defining the rules of the game was one thing which I emphasized right from the beginning of the project.” (Interview, September 15, 2014, 036)*  
Another manager added: *“It is part of the planning at the beginning. And hopefully these routines will stay set throughout the project.” (Interview, August 21, 2014, 116)*



**Figure 15: Dynamics of opening and closing leadership behaviors between the beginning and the end of the process**

### **Result focusing on differences of opening and closing leadership behaviors between different Stage-Gate generations**

Comparing the different generations, the items coded for “beginning of project” and “end of project” became less, while items with regard to “overall leadership behaviors” turned out to be more relevant over generations. In this regard, figure 16 indicates the decreasing attribution of items across generations. The continuous line indicated within the 2<sup>nd</sup> generation process model reflects the clear attribution of opening and closing leadership behaviors to the beginning and to the end of the process. The roughly dotted line within the 3<sup>rd</sup> generation process model reflects the behaviors of project leaders within such generation who already faced difficulties to clearly attribute specific behaviors to the beginning and the end of the process. Finally, the finely dotted line by which leadership behaviors within next generation process models is indicated, reflects cases in which project leaders could barely identify specific leadership behaviors shown at the beginning and at the end of the process.



**Figure 16: Dynamics of opening and closing leadership behaviors between the beginning and the end of the process indicating the decreasing ability of project leaders to attribute items across Stage-Gate generations**

### 4.3 DYNAMICS OF OPENING AND CLOSING LEADERSHIP BEHAVIORS ON THE SINGLE STAGE LEVEL

During the following chapter the results with regard to every single stage of the innovation process are focused on. The structure of each stage description changes depending on the results provided during the interviews. In general, results of this chapter first cover the occurrence of single as well multiple items of opening and closing leadership behaviors within stages. Secondly, differences of opening and closing leadership behaviors between different Stage-Gate generations are emphasized. The model in the end of this chapter shows the overall result as well as the results with regard to the three Stage-Gate generations (see figure 22).

#### Discovery

This initial stage, which serves for the discovery of business opportunities and for the generation of ideas, was found to be generally uncouples from the rest of the development process. In terms of leadership behaviors, almost no information was given by the interviewees with regard to stage 0, since no formal project team was established at that time. Generally, ideas for future products were derived from many different areas of the organization. In this respect, no direct leader-follower relation could be identified during this stage:

*“Idea creation just happens along the way. That cannot be attributed to a specific stage. The discovery of ideas also takes place during the implementation stage.”* (Interview, August 13, 2014, 050). *“(...) there are product managers, who have to take care that the product is up to date. Those draw most of their ideas from the sales department or consulting firms who know the customers’ viewpoint. In addition, the project team comes up with ideas about how to improve a product.”* (Interview, August 13, 2014, 046, author’s translation)

One company distinguished the research and the development phase for examples by separating research and development projects:

*„Especially at the beginning, where a product is hardly tangible, we often launch a research project before the actual development project starts. Then we conduct detailed research for half a year, where there is no marketable product at the end, but a clear picture of the real market need. Then prototypes can be built and tested quickly.“* (Interview, July 31, 2014, 031, author's translation).

Leadership behaviors during the discovery stage did reveal noticeable differences with regard to different Stage-Gate generations.

### **Scoping**

For the initial assessment of ideas and their feasibility, companies did most often initiate a workshop in which the project was introduced and discussed within the prospective development team. In terms of leadership behaviors, the occurrence of opening leadership behaviors exceeded the number of closing leadership behavior in terms to frequency and variance of items across all interviews. In this regard, almost half of the project leaders focused on team building (O7), encouraging experimentation (O10) and giving room for own ideas (O13) in order to encourage exploration activities of the team. In terms of closing behaviors, setting the project scope (C8) and establishing rules and routines (C 4) was prevalent in this stage. In large projects with several sub-projects and stakeholders, project leaders were facing a large pressure with regard to the timely product launch already at this early stage. Sticking to plans (C9) was therefore relevant from the project start:

*„We know our deadline from the beginning. (...) and we know the guidelines from our global development plan and from checklists. So every-*

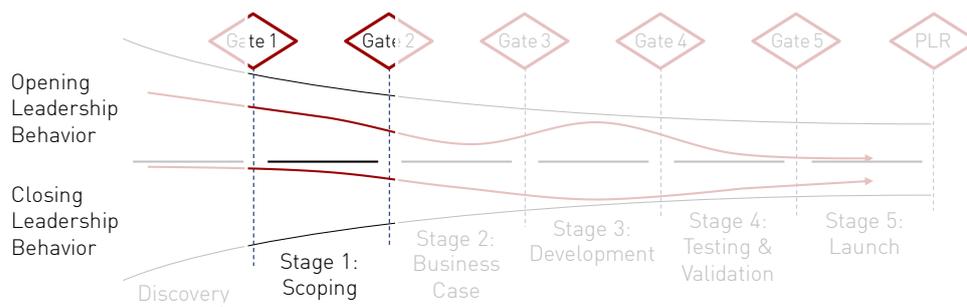
*body knows the checkpoints when things have to be delivered.” (Interview, August 15, 2014, 064)*

Another project leader added: *“The project specifications need to be completed until a certain milestone, after which the nomination (of the supplier) takes place. Accordingly, a plan does definitely exist.” (Interview, August 1, 2014, 122, author’s translation)*

Project leaders described instances during the innovation process in which they frequently changed between opening and closing leadership. One interviewee emphasized the importance of open discussions (O4) between technical departments to generate ideas (O10), while he always had to keep existing timetables in mind (C9). In another case, the project leader and his team was responsible for gathering and filtering product ideas from internal and external sources on the one hand (O12), while he had to monitor and control the goal attainment (C6) at the same time in order to stay focused on the overall target:

*“So in this stage we very often get input from current customers and generate continuously changes in the requirements. So we are very dynamic, flexible and so on. So my role is very much to evaluate and monitor that the overall target can be understood by the project team and that we can achieve it within the project frame. Quite flexible” (Interview, August 19, 2014, 056)*

The resulting model indicates the emphasis on opening behaviors during the scoping stage (see figure 17). Comparing the different Stage-Gate generations, it was noticeable that opening behaviors were generally the strongest during the scoping stage in 2<sup>nd</sup> generation processes. The depiction disregards the generation specific results. Those are provided later in this chapter (see figure 22).



**Figure 17: Dynamics of opening and closing leadership behaviors of the scoping stage**

### Business Case

During this stage the project team is primarily asked to provide data to the project leaders who specifies the project and splits it up into single development packages. In terms of opening and closing leadership behaviors, closing items increase in terms of variety and frequency. During this stage, especially controlling rules and routines (C4) as well as monitoring goal attainment (C6) was mentioned by the participants:

*“During this stage the goal orientation becomes increasingly noticeable. I mean, there is still the possibility to have a look at different topics in terms of how different concepts can be implemented, and assemble different things. That is possible. However, there are many things which are not possible any longer. Which means that there is no laissez-faire leadership any longer.”* (Interview, August 12, 2014, 070, author's translation)

During the business case stage, activities primarily focus on the exploitation of the formerly gathered knowledge about the product while exploration activities are needed to further specify the project. Therefore, leaders especially increased closing behaviors while being aware of the need to keep the team motivated for the subsequent development stage:

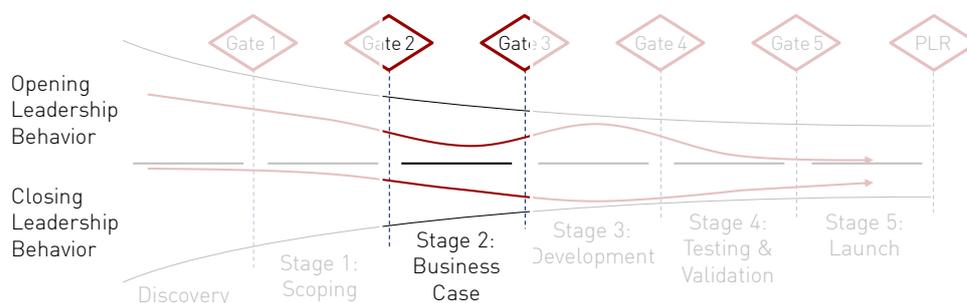
„One the one hand, you need to encourage the team to clearly specify the product. As I said: complete and consistent. Of course this reduces the freedom of action. (...)

Shortly afterwards he continued “You have to encourage the team to perform that task but also motivate that their freedom of action will again increase afterwards” (Interview, August 1, 2014, 056, author’s translation)

This awareness to keep the team motivated appeared to be stronger in 3<sup>rd</sup> and next generation processes. Project leaders of 2<sup>nd</sup> generation processes did most recognizably decrease opening leadership behaviors and increased closing leadership behaviors compared to the scoping stage:

“This is especially the case during the specification phase, where the team has to specify the product before they are actually ALLOWED to start the development.” (Interview, August 6, 2014, 186, author’s translation)

The resulting model indicates the decrease of opening behaviors, while closing leadership behaviors become more relevant during this stage (see figure 18).



**Figure 18: Dynamics of opening and closing leadership behaviors of the business case stage**

## Development

While the business case stage requires project leaders to motivate their team and encourage them to participate and specify the product, developers are now able to focus on the actual product realization. However, this stage is not purely led by creativity. Instead team members are responsible for the timely delivery of concrete development packages. In terms of leadership behaviors, the focus during the development phase is on monitoring the goal attainment (C6) and preventing overengineering especially from software developers. Opening as well as closing leadership behaviors both increased in terms of behavioral diversity. Even though both behaviors were found to be quite balanced, closing behaviors were more often shown than opening behaviors. However, most interviewees confirmed that even though they are increasingly bound to plans (C9) and need to take corrective action (C10), giving room for own ideas (O13) and openness for discussion (O4) stayed relevant:

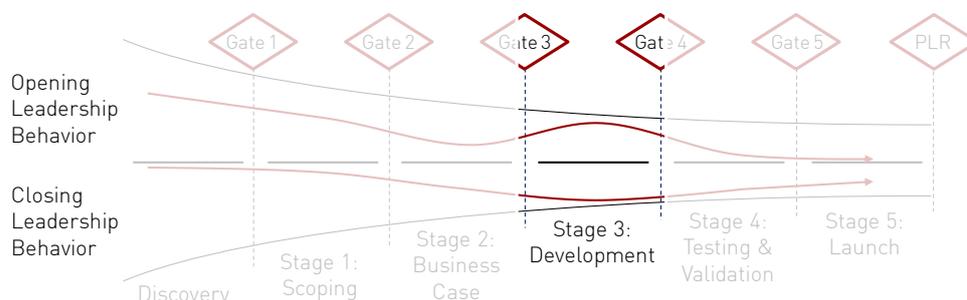
*„[...] and during the development stage, always the necessary degree of freedom within the given timeframe (...). That for sure! But of course we need to keep in mind the set target we have to reach.“* (Interview, August 19, 2014, 096)

Another project leader added: *“But it is also important to encourage the team to say STOP when there is a problem. And then we have a look at the problem together and see how we can solve it.“* (Interview, August 15, 2014, 092, author's translation)

Motivating experimentation (O10) and risk taking (O15) was less encouraged in this stage. Instead, especially in larger projects, sticking to plans (C9) and monitoring goal attainment (C6) was more emphasized than in smaller projects:

*“When we have an issue we cannot simply delay the deadline, NO! We have to find out WHAT IS necessary to get back on track?“* (Interview, August 15, 2014, 092, author's translation)

The resulting model indicates the increase of opening as well as closing leadership behaviors during the development stage (see figure 19).



**Figure 19: Dynamics of opening and closing leadership behaviors of the development stage**

### Testing & Validation

In most instances the testing and validation stage was following a specific sequence of events. With regard to opening and closing leadership behaviors, the majority of the interviewees emphasized the strict adherence of rules and routines (C2), especially in cases where the industry was highly regulated. This resulted in a decrease of opening behaviors, while closing behaviors stayed as important as during the development stage. Monitoring and controlling goal attainment (C6) and sticking to plan (C9) were primarily emphasized by project leaders:

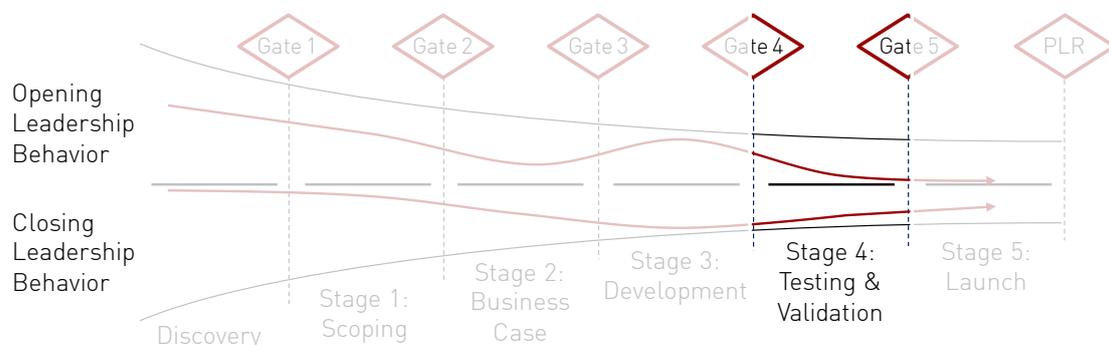
*„In this stage motivation becomes relevant again. Also control is important. (...) You have to take care that the documentation corresponds to the existing regulations. Of course you have to provide the regulations to the team. (...) Everything you do is target-oriented in order to ensure that things are on track. This becomes very important during this stage.” (Interview, August 6, 2014, 156, author’s translation)*

However, especially leaders from next generation processes showed openness for discussion (O4) and still encouraged their teams to engage in explorative action:

*“And when we reach the testing stage: Of course there are guidelines about how to implement things. However, when someone has a better idea, I am always open for discussion.”* (Interview, August 13, 2014, 122, author’s translation)

With regard to the different process generations, only for project leaders using the 2<sup>nd</sup> generation model, testing and validation was found to be executed within a separate stage. Most companies practiced regular testing and validation during the whole process, partially starting already during the scoping stage.

Taken together, opening behaviors became less relevant, while closing leadership behaviors prevailed (see figure 20).



**Figure 20: Dynamics of opening and closing leadership behaviors of the testing and validation stage**

## Launch

For the full production and commercialization of the product final problems needed to be solved quickly. However, the major task during this stage was to forward the product to the manufacturing facilities. In this regard, project lead-

ers intentionally tried to prevent opening behaviors. Only the exchange of information (O7) and giving regular feedback (O11) was actively encouraged in order to speed up the problem solving process:

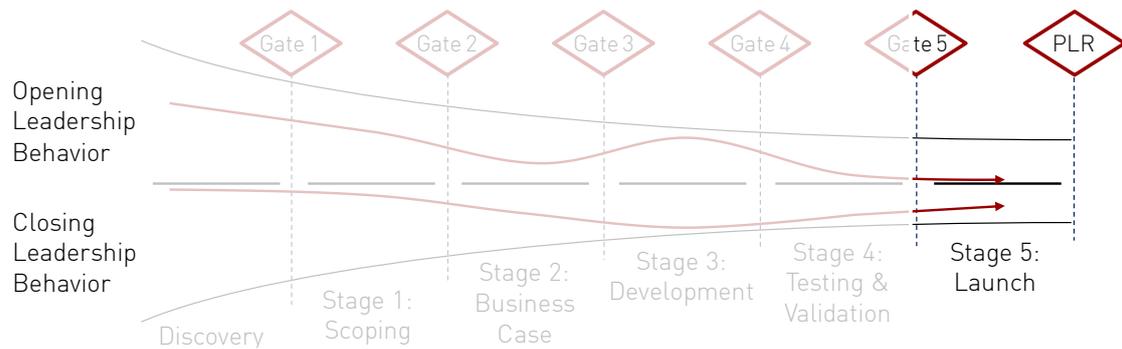
*“During this stage the development team works closely together, since short processing times require a frequent communication. Everything has to go fast.”* (Interview, August 12, 2014, 090, author's translation).

Another manager added: *“We are quite focused during this stage”* (Interview, August 1, 2014, 094, author's translation).

All “nice to have” developments were stopped (C3) and the frequency of reporting and controlling increased (C6). The variance of behaviors was largely reduced compared to the development and testing stage. Sticking to plans (C9) and increasing the pressure on the development team (C5) was prevalent in this stage in order to ensure a timely product launch:

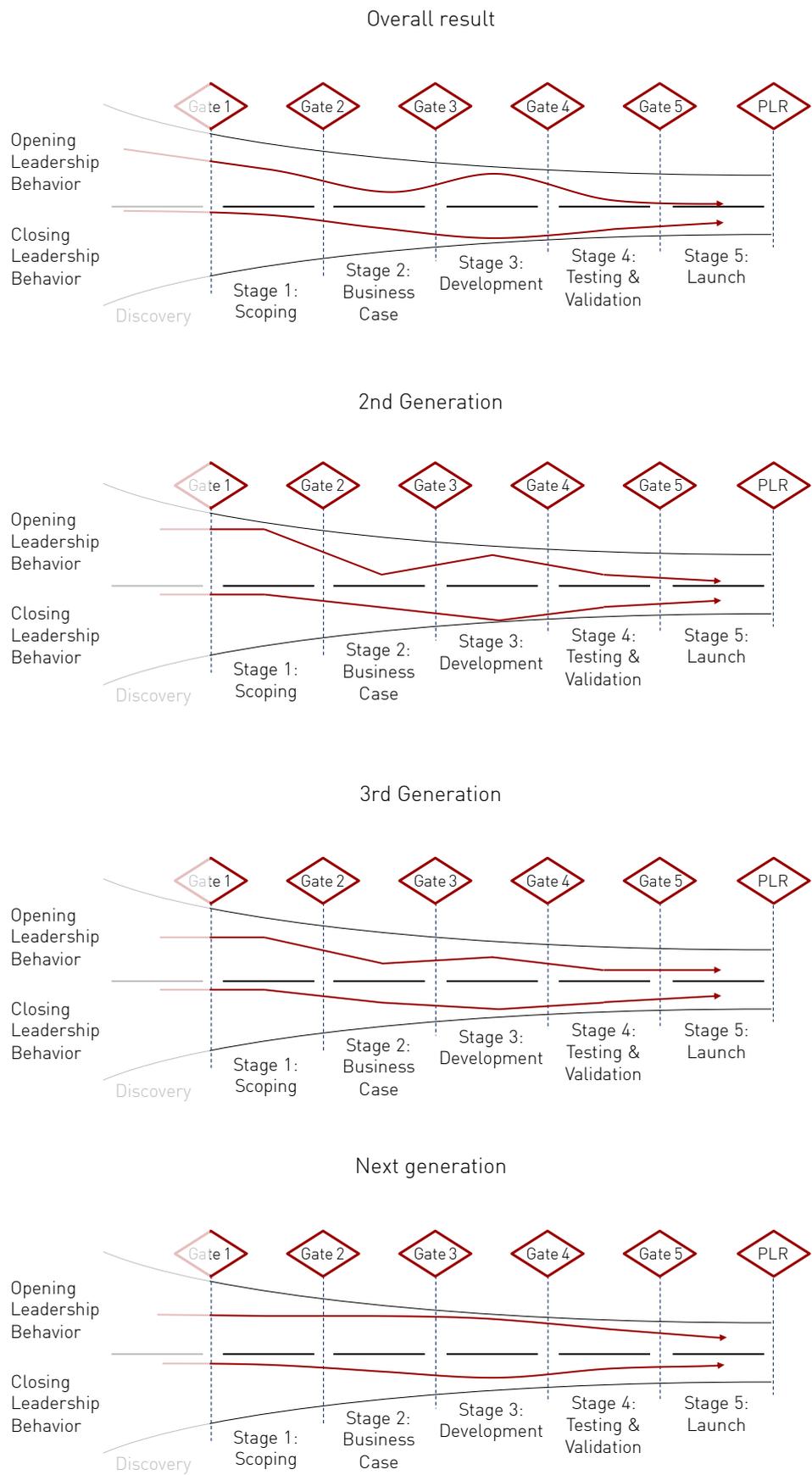
*“When I got two or four weeks for the commissioning, and not everybody can work on the vehicle, I need to setup a timeline which is scheduled by the hour. Timing is so tight that an overrun of one hour causes the delay of all subsequent steps.”* (Interview, September 15, 2014, 048, author's translation)

The model depicted below indicates that opening behaviors were almost not shown as all, while closing behaviors prevailed (see figure 21).



**Figure 21: Dynamics of opening and closing leadership behaviors of the launch stage**

Figure 22 depicted below initially illustrates the dynamics of opening and closing leadership behaviors across all Stage-Gate generations, followed by a comparison of results of all three process variants. For a better overview of results the graphic does maintains the sequential depiction of stages and gates to demonstrate the decreasing rigor in terms of allocation of items within specific stages. Since results with regard to the discovery stage did not reveal the assumed leader-follower relation the graphic masks this stage across all generations. Generally, opening and closing leadership behaviors were best attributable within 2<sup>nd</sup> generation processes. Leaders working with 3<sup>rd</sup> generation processes were less able to identify such stage specific behaviors. Finally, leaders from next generation processes were least able to relate their behaviors to certain stages. For this reason the dynamics of opening and closing leadership behaviors show an increasingly smooth transition between stages.



**Figure 22: Dynamics of opening and closing leadership behaviors on the single stage level illustrating the overall result and results specific to the Stage-Gate generations**

## 5 DISCUSSION AND CONCLUSION

In the following chapter the findings presented above are interpreted with regard to ambidextrous leadership theory and existing research focusing on leadership of innovation processes. Moreover, during the limitations chapter it is generally reflected on the research framework with regard to the suitability of linking the concept of ambidextrous leadership linked to the Stage-Gate model. Afterward, the methodological limitations are presented. Following the implications for future research and management, the conclusion finally reflects on the research objective.

### 5.1 INTERPRETATION OF FINDINGS

The following chapter initially covers the interpretation of the findings presented above. The composition of this chapter follows the same structure like the result chapter and interprets the findings on all three different levels of the innovation process (overall, beginning vs. end, and stage-specific) including differences among Stage-Gate generations.

#### 5.1.1 Opening and Closing Leadership Behaviors on the Overall Level

On the overall level, the most noticeable result is that although opening and closing behaviors were both shown, project leaders generally emphasized opening behaviors more than closing behaviors. Moreover, error sanctioning (C7) was regularly regarded to hamper the innovation process. This finding accounts for the assumption that creativity and the generation of ideas requires exploration (Cheng & van de Ven, 1996) which, according to Rosing et al. (2011), is encouraged by showing opening leadership behaviors.

Furthermore, irrespective of the normative character of the Stage-Gate process (Verworn & Herstatt, 2000), project leaders had to regularly pull the team away from their daily routines in order to get them engaged in creative problem solving activities. On the overall level, this is in line with the argument that the inno-

vation process is chaotic and nonlinear (Anderson et al., 2004) with regard to the fact that it cannot easily be planned over a longer period of time. Accordingly, project leaders regarded it necessary to encourage exploration whenever needed along the process and profit from the creative capacity of the development team. Closing behaviors were found to be necessary especially in later parts of the innovation process by which goal orientation was increased. This reminds of the orderly and periodic patterns of project activities found by Cheng and van de Ven (1996) in the end of innovation process. However, those behaviors were found to be shown rather punctually than permanently.

Opening and closing leadership behaviors were both found to be simultaneously present along the innovation process. This finding corresponds with the assumption by Rosing et al. (2011) that opening and closing leadership behaviors are complementary, which in turn matches the general assumption of studies in the context of organizational ambidexterity which emphasize the inseparability of both exploration and exploitation. In this regard, Gibson and Birkinshaw (2004) defined contextual ambidexterity as the behavioral capacity of individuals to show alignment (linked to exploitation) and adaptability (linked to exploration), within a business unit.

Another finding that can be drawn from the interviews was that the flexible switching between opening and closing leadership behaviors as proposed by Rosing et al. (2011) was found to occur unconscious. On a different level of analysis, Shenhar (2001) found that project leaders did not consciously adapt their leadership style to different project types, however, he did not focus on the individual project leadership. Connecting to the generation-specific findings, especially project leaders from 2<sup>nd</sup> generation processes identified controlling adherence of rules (C2), allowing errors (O2) and encouraging error learning (O9) to be self-evident and present throughout the whole process. Those behaviors seem to have a general relevance at the whole process and are shown punctually. Another finding with regard to the three different generations was that the tendency of leaders to show opening behaviors increased noticeably from 2<sup>nd</sup> to next

generation processes. Given the need to speed up the development process in addition to the postulated agility and adaptability as argued by Cooper (2014), especially project leaders of next generation project do not have the capacity to control the innovation process in detail. Instead, they processes delegated the project responsibility to the project team and empowered it to make decisions and be responsible for decision-making in innovation processes. Within those projects, the team had to monitor their own progress and define and justify the amount of resources needed for the current project. In this regard, Dougherty (1996/1998), McDonough and Barczak (1991) emphasized the need for increasing team autonomy as well as the accountability for decision-making. However, only software developing companies using agile development methods applied such practices.

With regard to the gate meetings, some leaders increased closing leadership behaviors before gates and reduced it after gate meetings. This effect is interpreted to reflect the increasing pressure to deliver the formerly agreed deliverables to the gatekeepers. However, in most cases gate meetings did not lead to a change in leadership behavior. Three reasons could to explain this finding. First of all, contrary to the Stage-Gate literature, project leaders of smaller projects arrange gate meetings only when they reached the agreed status, and did not fix the next gate meeting during the gate before (Cooper, 2008). Secondly, especially project leaders of larger projects constantly monitored and controlled goal attainment (C6) and were able to detect potential delays already early during the process stage. In addition, regular review meetings among team members and together with the project leader enabled a steady process irrespective of the intermediate gate meetings. In the third place, for a majority of companies, gate meetings did not have the decisive character of a Go/Kill decision. Instead, they were rather seen as a possibility to review and discuss the current project status together with the assigned gatekeepers. This refers to on one of Cooper's major points of critique since a lot of companies do not practice the Stage-Gate process as originally intended (Cooper, 2009).

With regard to the gate meetings, there is only little indication that those affect the dynamics of opening and closing leadership behavior. Moreover, within the second part of the interview, none of the project leaders attributed any of the presented leadership behaviors to be relevant shortly before or after gate meetings. In this regard, the intermediate gate meetings seem not to affect opening and closing leadership behaviors on the overall process in most cases. Instead, changes in leadership behaviors rather seem to indicate a lack of project management.

### **5.1.2 Dynamics of Opening and Closing Leadership Behaviors between the Beginning and the End of the Process**

The most noticeable finding with regard to the distinction between the beginning and the end of the Stage-Gate process was that project leaders largely associated opening behaviors with the beginning of the process and closing behaviors with the end of the process. This is in line with the findings from Cheng and van de Ven (1996) and West (2002) who claim that the beginning of the innovation process rather requires explorative activities and creativity, while the end of the process especially requires exploitative activities. In this regard, leaders argued that the pressure generated by timetables and interdependencies between innovation teams automatically leads to an increase of closing leadership behaviors at the end of the process. Project leaders then often forward this pressure to the project team (C5) by increasing the frequency of leader-follower interaction as well as the interaction between other sub-projects.

However, leaders partially showed closing behaviors (e.g. establish rules and routines; C4) also early in the project. On the other hand, opening behaviors such as openness for discussion (O4) and initiation of the problem solving process by asking questions (O14) were shown in the end of the project. This finding corresponds with Bledow et al. (2009) who argue that exploration and exploitation are not mutually exclusive but rather interwoven and mutually interdependent. In this regard, idea creation also require the exploitation of existing knowledge, while idea implementation require a certain degree of exploration

when it comes to changing routines and the adapting implementation strategies (Rosing et al., 2011). Another situation in which leaders encouraged their team to stay explorative during the project implementation was to generate and list ideas (O13) for follow-up projects. This reminds of the findings by Raisch and Birkinshaw (2008) who argue that exploration and exploitation, respectively opening and closing leadership behaviors, always complement each other. Taken to the individual level, project leaders are required to effectively manage the current project, while encouraging the team to generate ideas for possible follow-up projects.

With regard to the item motivating to take risks (O15), some participants explained that innovation always involves risk taking but that risk needs to be managed. This also confirms the prevalent view that innovation always includes risk (Andriopoulos & Lewis, 2010). The majority allocated this item at the beginning of the innovation process, which might link to the exploration activity at the beginning (Cheng & van de Ven, 1996). It was found that especially the item paying attention to uniform task accomplishment (C11) was most frequently attributed to the end of the process. That finding underlines the increasing focus and routine orientation of project leaders in later stages of the innovation process (Cheng & van de Ven, 1996).

Connecting to the initial chapter about the overall process, the distinction between opening and closing behaviors at the beginning of the process compared to its end became less clear with growing Stage-Gate generations, since leaders increasingly attributed behaviors to the overall process. This finding supports the notion that idea generation and idea implementation cannot be allocated to distinct phases (Rosing et al., 2010). However, this effect was only found within next generation processes which have been characterized by overlapping stages, frequent iterations and the application of agile development methods (Cooper, 2014).

### **5.1.3 Dynamics of Opening and Closing Leadership Behaviors on the Process Level**

The following section explicitly focuses on the interpretation of the results with regard to the individual process stages. Besides the theory of ambidextrous leadership (Rosing et al., 2011) and its first empirical support by a recent study (Zacher & Rosing, 2014), the author reflects on existing literature which relates project leadership to different stages of the innovation process (Frame, 1987; Turner, 1999; Verma & Wideman, 1994).

#### **Discovery**

According to Rosing, the leader-follower relation is generally supposed to persist along the whole innovation process (Rosing, personal communication, 2014). Accordingly, the whole process was considered in this study. This initial stage 0, discovery, is described by Cooper as the necessary pre-work for the actual process ("The Stage-Gate® product innovation process | Stage-Gate international," 2014). Results show that the discovery stage was uncoupled from the rest of the innovation process in most cases. In this regard, the project leader, if involved during the discovery stage at all, did not yet hold his later leadership role. In fact, the surrounding innovation team consisted of experts of a certain field with more expertise than the project leader (Turner, 1999). Accordingly, even if opening and closing leadership behaviors were shown, they were not directed at the team of the subsequent stages.

#### **Scoping**

With regard to the scoping stage, the occurrence of opening leadership behaviors exceeded the number of closing leadership behaviors in terms to frequency and diversity of items. This result can be linked to the findings from Cheng and van de Ven (1996) and West (2002) who assume a that exploration activities are especially important during the beginning of the innovation process to encourage creative thinking and acting. Frame (1987) argues that this creative design phase requires a leader to adopt a laissez-faire style, which is especially suita-

ble to encourage creative workers who dislike a constant supervision. However, in contrast to the laissez-faire style, which is supposed to lack an efficient information channeling and goal orientation (Frame, 1987), leaders were also found to show closing behaviors such as sticking to plans (C9) at the same time. This especially reflects the overall goal orientation which was communicated to the project team from the beginning of the process and exemplifies the simultaneous presence of opening and closing leadership behaviors as proposed by Rosing et al. (2011).

With regard to the different Stage-Gate generations, opening leadership generally were emphasized during the scoping stage across all generations. However, especially within 2<sup>nd</sup> generation processes, leaders were able to attribute opening behaviors to the scoping stage, whereas leaders of next generations were least able to do so. This finding seems to underline the strong distinction between both process generations (Cooper, 2014). While leaders within the traditional 2<sup>nd</sup> generation model are particularly concerned with the exploration of initial ideas, leaders of next generation projects needed to manage spiral development practices which, according to Cooper (2014), require the continuous management of “build, test, feedback, revise- development spirals”. In this regard, idea creation and idea implementation alternate continuously and require the leader to act accordingly (Rosing et al., 2011).

### **Business Case**

During the business case stage, the project team was primarily asked to provide data to the project leader in order to specify the project. Even though the further exploration of ideas was relevant, project leaders increased closing behaviors in this stage. Frame (1987) argues that the conceptualization phase requires leaders to increase alignment and convergence. In this regard, Turner (1999) suggests a democratic leadership style which shows openness to the team members' suggestions regarding the project specification. At the end the project leader determines the project specifications and development packages. However, findings indicate that project leaders seem to increasingly engage in bal-

ancing opening and closing behaviors. Besides the data requirements, they depend on the team feedback and commitment to deliver precise information. This is especially reflected by the democratic leadership role proposed by Turner (1999) during the design phase.

With regard to the different Stage-Gate generations, the shift from opening to closing leadership behaviors was especially prevalent in 2<sup>nd</sup> generation processes. This seems to reflect the particular focus on the project specification, while project leaders from later generations already engaged in prototyping and spiral development activities (Cooper, 2014). Instead, leaders from 2<sup>nd</sup> generation processes primarily focused on the data delivery for the business case and not on the further development of the product idea. In contrast, within next generation processes, parallel processing led to a continuous adoption of the business cases though the process and across the traditional stages defined by Cooper (1990).

## **Development**

An interesting result with regard to the development stage was that opening and closing leadership behaviors both ranged highest in terms of diversity of behaviors and frequency during this stage. This is related to the major finding from Zacher and Rosing (2014) who found that innovation performance was highest when opening and closing leadership behaviors were high. Even though the link to innovation performance is not directly emphasized during this research, results indicate that leadership of the development phase requires a large diversity of different and even opposing behaviors (Andriopoulos & Lewis, 2010; Rosing et al., 2011). This might reflect the required flexibility of innovation leadership due to the often postulated unpredictability of the process (Turner, 1999). With regard to this stage, which predominantly dealt with the implementation of formerly specified idea, project leaders regularly had to handle unforeseen events, to which leaders had to respond to by adapting their leadership behaviors (Frame, 1987).

Although, opening and closing behaviors were found to be quite balanced, closing behaviors predominated. This finding underlines the general focus on idea implementation for which Turner (1999) proposes an autocratic leadership style. However, findings indicate that the beginning of the development phase is still more about creativity and opening behaviors, with regard to the “how” a certain product specification can be implemented by the sub-team, whereas the later development stage is mostly driven by a timely implementation which is encouraged by closing behaviors (Farr et al., 2003; Rosing et al., 2011). This might also be the reason why project leaders did not actively encourage experimentation and risk taking anymore, since both could potentially be costly and lead to delays (Turner, 1999).

### **Testing & Validation**

During the testing stage, project leaders emphasized rules and routines (C2) particularly in cases where industries were highly regulated and generally focused on the monitoring and controlling of goal attainment (C6). Moreover, project leads had to deal with a high pressure from upper management levels who required the timely product launch (Turner, 1999). In addition, interdependencies between sub-teams of the project were highest during the testing and validation (Barczak & Wilemon, 2003). Irrespective of the focus on closing behaviors during this stage, project leaders emphasized openness for discussion (O4) and exchange of information (O7) in order to encourage the generation of ideas for a fast problem solution. In this regard, Frame (1987) argues that skilled autocratic leaders, which are according to Turner (1999) best suitable for the execution stage, show openness to their team to provide feedback, even though decision making falls to the project leader at the end.

### **Launch**

Finally, during the product launch, the variance of opening as well as closing behaviors was highly reduced compared to both stages before and a small

amount of closing behaviors was predominantly shown. Results reflect the huge time pressure by which the project is driven during this stage (Verma & Wideman, 1994). Opening behaviors are largely prevented by project leaders. Instead, controlling the adherence of rules (C2) and sanctioning errors (C7) becomes prevalent. This largely corresponds to the description of Turner's (1999) bureaucratic leader who in this stage engages in administration tasks and the transfer of product information with his team.

## **5.2 LIMITATIONS**

With regard to the study limitations, the following chapter initially reflects on the theory of ambidextrous leadership and on the applicability of the Stage-Gate model in order to explore the dynamics of opening and closing leadership behaviors before methodological limitations are addressed.

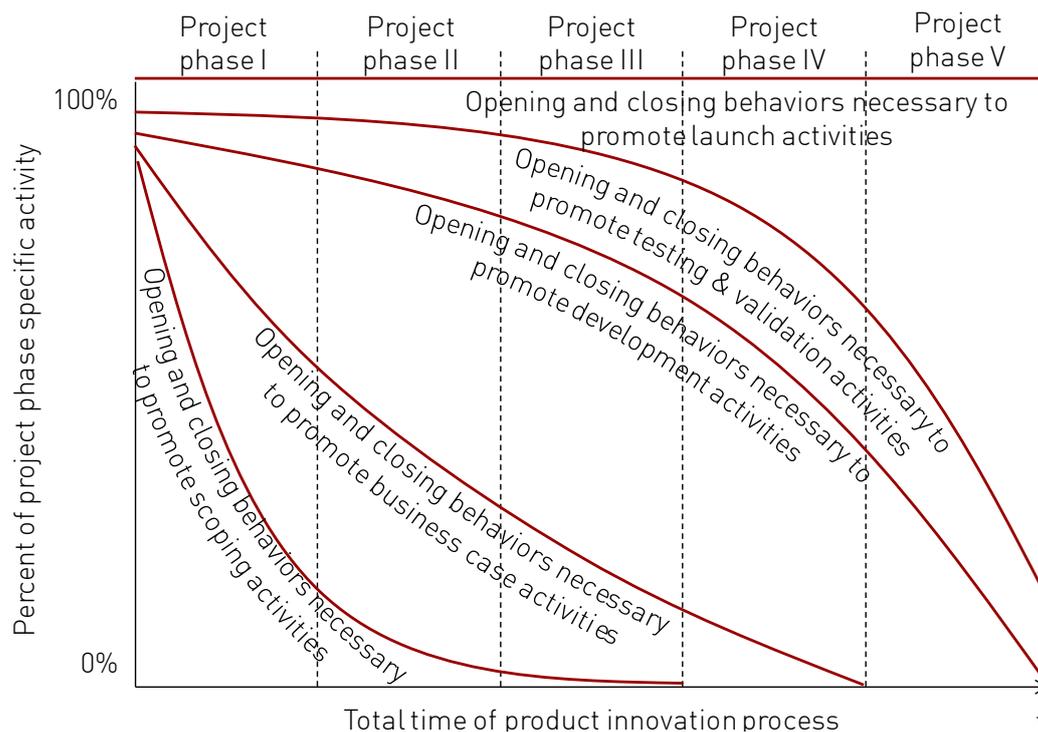
With regard to ambidextrous leadership, Rosing et al. (2011) admit that the developed items are not new to leadership theory, neither are the additional items developed during this research. The distinction to other leadership theories rather lies in the new categorization of leadership behaviors, which are especially supposed to be relevant during the innovation process, with regard to their ability to increase or decrease the variance in followers' behaviors (Rosing et al., 2011). However, the similarity to other leadership schools and especially to transformational and transactional leadership cannot be denied. In this respect, especially transformational leadership is frequently studied in the innovation context (Elkins & Keller, 2003). However, in contrast to transformational leadership, ambidextrous leadership has a different focus: Its invariable application to the innovation context, and the explicitly stated goal of ambidextrous leadership, namely an increase of innovation performance. However, innovation performance is not further specified so far. Furthermore, while single styles foster behaviors either stimulating exploration (e.g. transformational leadership) or exploitation (transactional leadership), ambidextrous leadership unites both behaviors by the opposing poles of opening or closing leadership. Transformational

leadership for example includes the promotion of an inspiring vision which according to Rosing et al. (2011) can lead to a increase and decrease of variance in followers behaviors and thereby promote and hinder innovation. For example, a leader who intends to support exploration would promote a motivating vision by showing opening behaviors. Instead a leader, who intends to foster exploitation, would promote a vision which targets confirmatory behaviors, such as the achievement of a precise goal (Rosing et al., 2011). Transactional leadership for examples fosters contingent rewards which according to Rosing et al. (2011) can lead to a reduction of variance, when leaders reward efficiency, or an increase of variance, when rewarding experimentation. Accordingly, opening and closing leadership behaviors can always be linked transformational and transaction leadership. For a more detailed discussion with regard to the distinction of ambidextrous leadership to other leadership schools see Rosing et al. (2011). In conclusion, transformational and transactional leadership theories are considered to be too brought, while ambidextrous leadership theory suggests concrete activities (Rosing, personal communication, 2014). In this regard, it addresses a general critique of contingency theories which are generally considered to lack precision and action orientation (Lewis et al., 2002).

With the help of the Stage-Gate model, the researcher was able to challenge the assumption of innovation process complexity and non-linearity and explore the most central part of the existing theoretical model. In this regard, the study at hand was able to profit from the model's intention to provide a clear structure to innovation activities. However, the over the past 24 years the Stage-Gate model has changed dramatically from what it was in 1990 to how the model represents today's innovation processes (Cooper, 2008). Apparently, Cooper's primary intention to give the model a self-explanatory and generic name turns out to be increasingly inappropriate from a today's perspective (Becker, 2006). Since its establishment, the model has developed in various directions in order to suit individual innovation requirements of its applicants. Even if he does not dismiss the term Stage-Gate Cooper does use the more generic term "idea-to-launch process" to elaborate the missing unanimity between practitioners and the

question if the notion of stages and gates actually still reflects today's innovation requirements (Cooper, 2014). According to the results of this study, the process was found to be neither stable and predictable, nor random (van de Ven, 1999) as assumed by Rosing et al. (2011), but it requires a sufficient degree of guidance in order to organize the "innovation journey".

In this respect, the degree to which stage specific activities are parallelized was suggested to have the most noticeable effect on the dynamics of leadership behaviors. Another model which is even more suitable to represent this specific aspect of leadership behaviors within next generation processes was developed by Crawford and Di Benedetto, C. Anthony (1994). Instead of a linear and sequential representation of the innovation process they emphasize the simultaneous management of process activities. Adapted to the specific setting of this study, three major findings can be illustrated by the model depicted in figure 22. The graphic divides up the innovation process into five unspecified phases which reflect the formerly defined stages of the innovation process model. As indicated by the red lines, each phase requires a different percentage of leadership activities traditionally linked to one specific stage. Project phases I to V thus always combine opening and closing behaviors of several stages and require the simultaneous management of formerly separated process stages of 2<sup>nd</sup> generation Stage-Gate processes. Based on this assumption, it can be argued that the increasing process parallelization leads to the difficulty for next generation project leaders to attribute specific leadership behaviors to specific stages traditionally proposed by the Stage-Gate model. Second, the overlapping of formerly separated stages is supposed to require an increasing behavioral capacity to simultaneously manage the requirements of the traditionally separated stages. Finally, a flexible and regular switching between opening and closing leadership behaviors as proposed by Rosing et al. (2011) can be explained, since the more stages need to be managed in parallel, the more often an innovation leader is supposed to switch between opening and closing leadership behaviors necessary to promote the activities of the respective stage.



**Figure 23: Parallel processing and the simultaneous management of formerly stage specific activities (adapted from Crawford & Di Benedetto, C. Anthony, 1994)**

However, the model primarily accounts for the aspect of simultaneous process management without taking into account the other aspects of next generation Stage-Gate processes presented in chapter 2.2.2. Even though this study focuses mainly on the aspect of parallelization, it is admitted that there are also other differentiating points between generations which were not taken into account. In addition, even though Stage-Gate generations are originally supposed to reflect the best practices of a certain period of time, the distinction between different degrees of process parallelization helped to explain the differences between leadership behaviors.

With regard to the methodology of this study, it is noted by Lee (1999) that qualitative research is not able to produce generalizable results, but is rather particularly suitable for the elaboration of a theory. In this regard, conclusions are specific to the studied events and need to be interpreted with regard to the individual context. According to Moustakas (1995), the challenge of transcendental

phenomenology is to perceive everything freshly as if the phenomenon was studied for the first time which is rarely achieved (Creswell, 2013). Another limitation of this study is that this research did not apply triangulation but solely relied on the information collected during the interviews. Accordingly, this study faces the general limitations of interview research. It was only able to receive self-reported information filtered through the individual perception of the interviewee (Creswell, 2013, p. 179). In this regard, leaders potentially described their desired behavior instead of their actual behavior during the project. The way of data collection via telephone or in person might have additionally influenced the results. In addition, participants may have had difficulties to articulate the situation as it was perceived. However, to prevent language barriers, 13 of in total 15 interviews have been conducted in native language. Another limitation is the small sample size and the cross-sectional character of this study. This was counterbalanced by focusing on a predefined project type based on the NCTP model introduced in chapter 2.3 (Shenhar & Dvir, 2013). However, thereby this study disregarded more incremental or more radical innovation projects. Moreover, the definition of "beginning or end of project" was only loosely specified before the interview, leaving its interpretation to the interviewees.

The data analysis process revealed an unequal distribution of interviewees to the process generations under consideration. With four participants allocated within the 2<sup>nd</sup> Stage-Gate generation, six in the 3<sup>rd</sup> generation and five in the next generation, the overall result mainly reflects the dynamics of opening and closing behaviors within the 3<sup>rd</sup> generation processes. Due to the high individuality of innovation processes, it was particularly difficult in some cases to assign behaviors to the predefined Stage-Gate framework of five stages and five gates. However, Cooper's stage-specific descriptions supported its attribution during the coding process. In addition, the pre-defined examples of opening and closing leadership behaviors have not been defined before by Rosing et al. (2011) and were individually interpreted by the interviewees. Definitions have been developed during this study (see table 3 and table 4). In particular allowing different ways of accomplishing a task (O1), establishing routines (C4) and controlling ad-

herence of rules and routines (C2) were perceived differently by participants. Moreover, the German translation of allowing errors (O2), which was provided by Rosing in addition to all other translations, has been criticized. Instead of “toleriere Fehler” it is suggested to use the following translation: “lasse Fehler zu”. Due to the distinction of the interview within two parts, which allowed a comparison of answers given during both sections, this study was able to increase the overall reliability of interpretations. With regard to the targeted outcome of ambidextrous leadership, it has not been able to identify differences in innovation performance (section 6 of the interview). However, all participants confirmed that performance was not about generating additional innovations but rather about a better performance of few products.

### **5.3 IMPLICATIONS FOR FUTURE RESEARCH**

In terms of implications for future research, studies should include the followers’ perspective to which this study did not have access in order to increase the validation of existing results. This could lead to better insights about how followers actually react to opening and closing leadership behaviors. Furthermore, this study only took into account the need for ambidextrous leadership with regard to the leader-follower relations. The general need to show ambidextrous behaviors towards other stakeholders has not been taken into account. However, one has to be aware that project leaders are in regular contact with multiple stakeholders throughout the whole process (e.g. marketing, sales, or manufacturing). This might ask for ambidextrous behaviors which need to be shown in addition to the leadership behaviors towards the team.

Moreover, a bigger sample size could consider a larger spectrum of innovation types without focusing on the NCTP framework. In addition, a distinction between research and development project could be made, since both processes are frequently separated. Future research could focus on the targeted innovation outcome and probably identify a specific set of behaviors that lead to a better performance than others. Besides, opening and closing leadership behaviors

need to be defined more precisely by future studies to prevent misconception. This study also indicates that project leadership cannot only be described by opening and closing leadership behaviors instead, additional behaviors complement a leader's behavior. In this regard, future research could distinguish between fix and variable behaviors. The variable behaviors reflect opening and closing leadership, whereby the fix behaviors include for example continuous motivation, acting as an example for followers, communicating the overall vision etc.. Such behaviors are rather long-term and also dependent on the individual personality of a leader which is not supposed to be changed along the process (Bledow et al., 2009).

In addition to the innovation process stages, there seem to be additional context factors which shape opening and closing leadership behaviors. For example, an increasing degree of innovativeness seems to ask for greater emphasis on opening leadership. Beyond that, company culture seems to influence the degree to which employees are reacting to opening and closing leadership behaviors as well as the individual character of a team member (Bledow et al., 2011). Study results also revealed inter-cultural differences with regard to project leadership. Especially Sweden is considered to have a much lower masculinity index compared to Germany and Switzerland which seemed to especially impact closing behaviors ("Sweden - Geert Hofstede"). In this regard, future studies should take cultural differences into consideration. Moreover the role of the leader within the organization (e.g. disciplinary leadership vs. functional leadership) seems to affect leadership behaviors. Besides, the project size and the number of stakeholders involved especially reinforce the items sticking to plans (C9) and establish and control the adherence of rules and routines (C2, C4). Finally the degree to which an industry is regulated seems to strengthen the adherence of rules and routines (C2). Most of these contextual factors have already been identified by Ortt and van der Duin (2008) and could all be considered in future studies of ambidextrous leadership.

## 5.4 IMPLICATIONS FOR MANAGEMENT PRACTICE

Concerning the management implications, chapter 5.4 distinguishes between implications for project leaders, for project management directors, and human resource managers. First, for project leaders results imply that innovation leadership is not about the application of a fix style, but rather about different sets of behaviors which either stimulate exploration or exploitation along the innovation process. Those leadership behaviors depend on the individual innovation context and need to be adapted continuously according to the intended follower behavior. In this regard, a project leader is required to recognize the need to show opening behaviors, which are supposed to stimulate exploration, or closing behaviors, which are supposed to stimulate exploitation, toward the team (Rosing et al., 2011). In general, the beginning of the innovation process requires the demonstration of opening behaviors, while the end of the process demands for closing leadership behaviors. However, both behaviors need to be regarded as complementary. They are never exclusively shown and always need to be balanced during the process even though their focus changes during the process. Besides the shifting focus of opening and closing leadership behaviors during the process, the different process stages require a different behavioral diversity of their project leaders (Zacher & Rosing, 2014). This especially applies to the development stage in which creativity and implementation activities converge. On the other hand, changes in leadership behavior before or after gate meetings should generally be prevented as they rather reflect panic reactions as a result of insufficient process monitoring during the process stage. In addition, the general setup of the innovation process is supposed to be decisive for the adaption of leadership behaviors. In this regard, innovation processes which, can be split up into distinct stages, require a smaller diversity of leadership behavior. Instead, an increasing process parallelization requires project leaders to simultaneously manage the activities from formerly separated process stages. This increases the diversity of leadership behaviors which are continuously necessary (Rosing et al., 2011). In consequence, this especially applies for example to companies with an extensive software development which make use of agile development methods. Besides, an increasing parallelization of innovation process

stages requires project leaders to empower their project team in terms of decision making and responsibility. Both seem to require an increasing focus on opening behaviors while leaders should empathize a clear set of some strict rules simultaneously (Cohn, 2010). Generally, opening and closing leadership behaviors enable a steering of the process. However, a full control of innovation does not seem to be possible (van de Ven, 1999).

Secondly, project management directors need to become sensitized to the necessary degree of ambidextrous leadership with regard to each project and select adequate project leaders. Moreover, project management directors need to be aware that the acceleration of innovation processes increases the leadership requirements for project managers. Third, for human resource managers this study implies that innovation processes have become increasingly complex and pose new challenges especially to the human resource development. In this regard, the human resource department is required to react with adequate development programs which address the current requirements of innovation leadership (Murphy & Ensher, 2008). Regular trainings could sensitize project leaders that different innovation contexts require different leadership behaviors. Moreover, especially highly paralyzed processes asks for innovation leaders who are able to delegate responsibility and team members who are able to deal with increasing responsibility (Dougherty, 1996/1998). This requires a cultural change and the adaption of project management development programs. The establishment of an annual review of innovation leaders could for example encourage the exchange of project leaders' experiences in different situations and help to develop shared competences within an organization.

## **5.5 CONCLUSION**

The goal of this research was to explore the dynamics of opening and closing leadership behaviors along the product innovation process. In this regard it was possible to identify dynamics on three different levels of detail of the innovation process (i.e. overall, beginning vs. end, stage-specific), as well as between three

different innovation process generations (i.e. 2<sup>nd</sup>-, 3<sup>rd</sup>-, and next generation) of the Stage-Gate model. In general, opening and closing leadership behaviors were found to be complementary behaviors, which are simultaneously present during the process in a different intensity. On the first level, the study found that different process stages require a different behavioral diversity from the project leader. While during the scoping stage, leadership behaviors consistently focused on opening leadership, the stages of testing and validation, and launch showed a noticeable focus on closing behaviors. The development stage instead revealed a relatively balanced distribution of both types of leadership. The diversity of behaviors was highest during this stage which has been interpreted as the need for high ambidexterity. On the second level, the distinction between the beginning and the end of the process, project leaders generally associated opening behaviors, with the beginning of the innovation process, and closing behaviors, with the end of the process. On the third level, the overall process level, closing behaviors increased though the process, while opening behaviors decreased. This is in line with the general assumption that even though exploration and exploitation are always simultaneously present, exploration is prevalent at the beginning of the process, while at the end the focus is on exploitation (Cheng & van de Ven, 1996; West, 2002). However, opening behaviors were generally more emphasized by project leaders than closing behaviors.

Besides the three different levels of analysis, the study identified differences in the dynamics with regard to three Stage-Gate generations which have emerged over time. During the analysis, all three process generations were found to be applied today in order to organize new product development processes (Nobelius, 2004; Ortt & van der Duin, 2008). In this context, opening and closing leadership behaviors shifted from stage-specific behaviors towards omnipresent leadership behaviors with growing Stage-Gate generations. More precisely, while leaders of 2<sup>nd</sup> generation Stage-Gate processes were able to identify opening and closing leadership behaviors which are especially characteristic for a certain stage, leaders of next generation processes showed a rather constant spectrum of behaviors, which were not attributable to a specific innovation stage

anymore. In this regard, it is supposed that project leaders are increasingly asked to manage the activities of formerly separated process stages and therefore need to have a larger portfolio of different behaviors at their disposal. In consequence, leadership behaviors become less attributable to the traditional succession of project stages as defined by (Cooper, 1990), but seem to follow the contingency perspective proposed by Rosing et al. (2011) according to which the innovation process cannot be easily separated into distinct stages. However, this result is specific to project leadership within the emerging next generation of more flexible, adaptive, agile and accelerated innovation processes (Cooper, 2014). On the one hand, project leaders of those processes emphasized a small set of clear rules and regulations, which is linked to closing behaviors. On the other hand, exploratory behaviors were generally encouraged by showing opening behaviors through the whole process, as long as the project team acted within this existing set of rules.

For the exploration of the ambidextrous leadership theory from Rosing et al. (2011), the Stage-Gate model provided a detailed framework and allowed for a clustering of company-specific models within three different process generations. However, the representation of innovation processes into separated stages reflects less and less stage-of-the-art innovation practices. Besides the different process requirements along the innovation process, there are indications for a number of other contextual factors which seem to affect the decision to show opening and closing leadership behaviors. Moreover, it is still questionable to what extent ambidextrous leadership behavior is consciously shown. This research is not able to relate leadership behaviors to the innovation outcome and thus cannot judge whether or not ambidextrous leadership is able to positively impact innovation performance. Besides the performance link, this study did not directly address the question, whether both behaviors encourage followers to engage in exploration or exploitation activities. Finally, this study only explored the leadership behaviors toward the innovation team and not towards other stakeholders within the innovation process. Thus, even though the need for ambidextrous leadership towards the development team is highest during the de-

velopment phase, the leader might be required to act ambidextrous towards other stakeholder groups also during other stages of the innovation process.

In conclusion, this study provides the much needed extension and empirical validation of the initial model of ambidextrous leadership for innovation developed by Rosing et al. (2011). The research contributes to the existing literature by underlining the importance of ambidextrous leadership especially for project leaders working with modern next generation innovation processes. In particular, results indicate that the need for ambidextrous leadership increases with the degree to which innovation process stages are processed in parallel. Moreover, findings point out that the need to act ambidextrous toward the development team is especially large during the development stage. In addition, existing items of opening and closing leadership behaviors have been defined and refined which are supposed to reflect the leadership requirements within the innovation process. New items have been identified and integrated into the existing model.

## VII APPENDICES

### APPENDIX I: INTERVIEW HANDOUT

#### Interview Handout

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**What:** Companies which are using the Stage-Gate or other form of Toll-Gate process for their product development

**Who:** Project managers, who lead product development teams

**What for:** One ca. 45 minute interview (in person or via telephone)

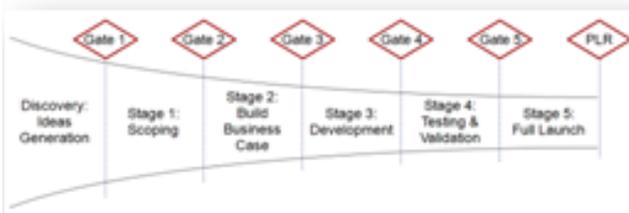
**When:** July/August (anytime, individual appointment setting after sending the interview guideline)

**Topic of master thesis:** A systematic approach towards ambidextrous leadership in innovation management processes: Exploring the dynamics of opening and closing leadership behavior along the Stage-Gate model

**Research context:** At the beginning of 2014, Robert Cooper, the inventor of Stage-Gate (figure 2), published an article about how the model has evolved in leading companies due to today's innovation requirements. The formerly rather normative process of pre-defined stages and gates with strict assessment criteria developed towards a more agile and adaptive process. In modern innovation processes, stages and even activities within



the stages are regularly overlapping. Requirements for Go/Kill decisions at the gates become unique to each project and different context dependent Stage-Gate versions are applied in order to best fit into a given (internal/external) innovation context.



In such innovation environments, the project leader faces an increased and more diverse spectrum of tasks than in earlier times. Against this background, it is proposed that a single leadership style cannot promote innovation effectively. Instead, a combination of different leadership behaviors flexibly applied to changing requirements within the innovation process is more effective.

**Research Goal:** It will be assessed how project managers adapt their leadership behavior in changing innovation process contexts (incremental vs. radical innovations and along the innovation process) in order to provide implications for effective leadership.

**Your benefit:** The anonymized research results including an executive summary will be provided exclusively to the participating companies. Project leaders will benefit from further insights about how project leaders of other firms apply different leadership behavior depending on the innovation context. For project management directors the research implies which type of project leader is best suitable in which innovation context. Human resource managers will receive further insights into the requirements of project leadership within today's innovation processes in order to derive implications for effective HR development programs.

**Data security and FAQ's:** All data will be used confidentially, processed anonymously and only be used for the present research. The individual setup of your development process will not be part of the research! The research is not about right or wrong leadership behavior of project managers but rather about learning from others about how different leadership behavior yields the highest success in changing innovation contexts along the innovation process and between different process variants.

I would be very pleased about your participation.

Kind regards

Tim Voigt

## APPENDIX II      COVER LETTER

### Interview Cover Letter

Dear Mr./Mrs. ,

...

In preparation to the interview I would appreciate if you could already consider a past project in which you as a project manager led your own project team though the entire product development process. It is important that this project was based on the Stage-Gate model which divides up that development process into distinct phases.

The optimal case would be:

- A project which resulted in the launch of a new product generation within an existing product family
- A project which incorporated new and existing technologies
- A project which needed to be finished within a given time frame e.g. for reasons of competition

If you do not have any further questions, we will discuss everything else during the interview.

Attached you will find the interview guide as well as the study consent for your participation.

Kind regards

Tim Voigt

## APPENDIX III: INTERVIEW GUIDE (ENGLISH AND GERMAN)

Tim Voigt

tim.voigt@campus.tu-berlin.de

+49 177 4816 442

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### *University of Twente*

UTwente • Office RA 2117 • P.O.Box 217 • NL-7500 AE Enschede

Dr. Tanya Bondarouk

FACULTY OF BUSINESS  
ADMINISTRATION

DEPARTMENT OF  
HUMAN RESOURCE  
MANAGEMENT

UNIVERSITY OF  
TWENTE.

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### *Technische Universität Berlin*

TU Berlin • Sekr. VWS - ODW • Straße des 17. Juni 135 • D-10623 Berlin

Prof. Dr. Klaus W. Döring

FACULTY VII  
ECONOMICS AND  
MANAGEMENT

DEPARTMENT OF  
TECHNOLOGY AND  
INNOVATION  
MANAGEMENT



#### **Introduction to the interview**

Thank you very much for your intent to participate in the interview. The research is supervised by Prof. Dr. Klaus W. Döring, professor for leadership and strategic human resource development at the chair of technology- and innovation management at the Technical University of Berlin and Tanya Bondarouk, professor for human resource management at the University of Twente. As described in detail in the interview handout provided in my last email, the interview will explore differences in leadership behavior along different phases of the Stage-Gate innovation process. In particular, different project stages should be defined in which you especially intend to increase or decrease the freedom of action of your project team with your leadership behavior.

The interview will last between 45 and 60 minutes. Participation is voluntary. You are allowed to refuse answering any question. The interview will be taped and typed up so that it can be properly analyzed. Your personal answers will be treated in a confidential manner. Your personal name and company will be made anonymous in order to respect privacy. Only the interviewer and the research team will be able to access your original interview answers.

At the end of the research project, I will provide a summary report of the results. If you have any question or something is not clear, please feel free to ask anytime.

Kind regards

Tim Voigt

## Interview guide

### Part 1 – Introduction

- 1.1 How long have you been working for the current company?
- 1.2 How long have you been working as a project manager?
- 1.3 Approximately how long have you been using the Stage-Gate model for organizing your product development process?
- 1.4 Can you roughly describe the project you selected for today's interview? (topic, team size, duration)
- 1.5 How many different project stages are you able to identify? (The process depiction below shows an example for a possible separation of stages. The predefined phases can be extended, shortened or renamed)
- 1.6 Do the project stages follow in succession? Do they rather overlap? Or are they characterized by frequent iterations within each stage and hardly distinguishable?

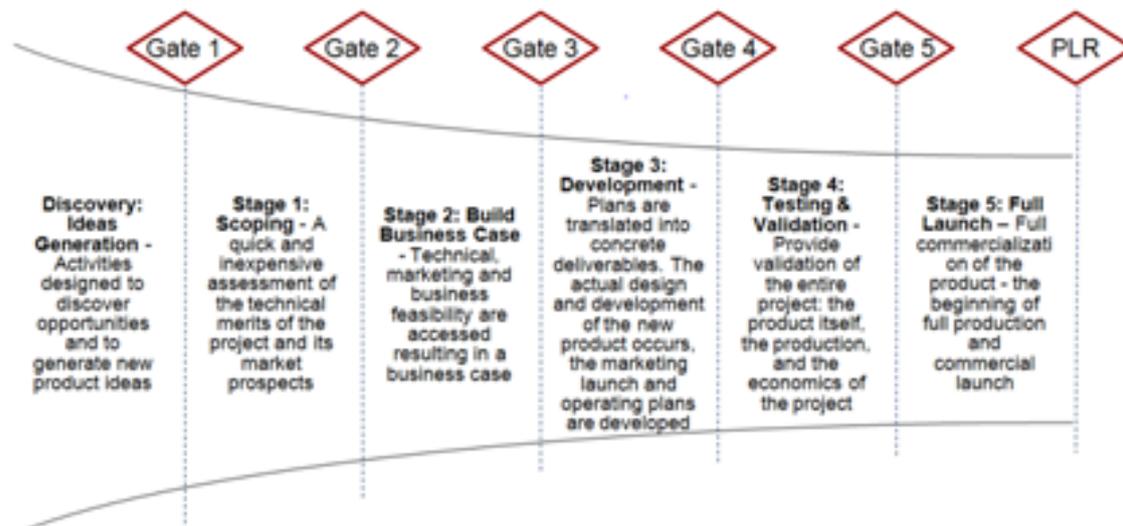


Figure 1: Stage-Gate Model phase division and -definition (Cooper, 2014)

### Part 2 – Introductory questions with regard to the leadership requirements within the Stage-Gate process

- 2.1 How would you characterize your leadership behavior with your project team in the given example?
- 2.2 From your point of view, do you generally notice differences in your leadership behavior between the beginning of the project compared to its end?
- 2.3 Can you give some examples of how your leadership behavior changed towards your project team with regard to those differences?

**Part 3 – Questions regarding the leadership behaviors within distinct process sections**

**Beginning with the first stage:**

- 3.1 How would you describe your role as a project leader with regard to your team in this stage?
- 3.2 What behavior especially characterized your team leadership within this stage?
- 3.3 How did your leadership behavior in this stage differ from your leadership behavior in the former stage?

**Part 4 – Questions regarding leadership behaviors across all phases of the Stage-Gate Process**

- 4.1 Did your leadership behavior change right before gate meetings?
- 4.2 Did your leadership behavior change right after gate meetings?
- 4.3 Do you intentionally or unintentionally vary the freedom of action of your team along the process with your leadership behavior? When and why are you doing so?
- 4.4 Do you intentionally or unintentionally vary the freedom of action of your team in certain process sections with your leadership behavior? When and why are you doing so?

**(Please do not turn the page, before Part 4 is finished)**

### Part 5 – Questions regarding the leadership behavior within distinct process sections: Supported

In this part of the interview I would like you to assign the examples of different leadership behavior depicted below to the different stages of your project.

- 5.1 Can the examples of leadership behavior presented below be assigned to a certain phase? Do they reflect constant behavior throughout the whole process? Or do they not reflect your leadership behavior at all? Why?
- 5.2 Can you give further examples on leadership behaviors which are not yet listed here?

**Not relevant. Especially relevant in stage/gate, beginning/end, constant:**

**As a leader I am...**

- |       |   |
|-------|---|
| _____ | 1. Allowing different ways of accomplishing a task          |
| _____ | 2. Monitoring and controlling goal attainment               |
| _____ | 3. Encouraging experimentation with different ideas         |
| _____ | 4. Establishing routines                                    |
| _____ | 5. Motivating to take risks                                 |
| _____ | 6. Taking corrective action                                 |
| _____ | 7. Giving possibilities for independent thinking and acting |
| _____ | 8. Controlling adherence to rules                           |
| _____ | 9. Giving room for own ideas                                |
| _____ | 10. Paying attention to uniform task accomplishment         |
| _____ | 11. Allowing errors   |
| _____ | 12. Sanctioning errors                                      |
| _____ | 13. Encouraging error learning                              |
| _____ | 14. Sticking to plans                                       |

### Part 6 – Questions regarding the innovation performance and project success

- 6.1 How do you/does your company define innovation performance?
- 6.2 From your point of view, what kind of leadership behaviors do you consider as especially relevant in order to achieve project success?

## GERMAN TRANSLATION OF INTERVIEW GUIDE

Tim Voigt

tim.voigt@campus.tu-berlin.de

+49 177 4816 442

### Interview Guide

#### Teil 1 – Einführung

- 1.1 Wie lange arbeiten Sie bereits in der aktuellen Firma?
- 1.2 Wie lange sind Sie bereits als Projektleiter tätig?
- 1.3 Wie lange nutzten Sie das Stage-Gate Modell für die Produktentwicklung in Ihrer Firma ungefähr?
- 1.4 Worum ging es grob in dem Projekt, das Sie sich als Grundlage für das heutige Interview ausgesucht haben? (Thema, Teamgröße, Zeitraum)
- 1.5 Wie viel verschiedene Projektphasen (Stages) können Sie in Ihrem Projekt identifizieren? (Das unten dargestellte Muster eines Stage-Gate Prozesses soll lediglich als Anhaltspunkt für die Abgrenzung einzelner Phasen dienen. Die vorgegebenen Phasen können beliebig ausgedehnt, zusammengefasst oder umbenannt werden.)
- 1.6 Stehen die Phasen in einer klaren Reihenfolge hintereinander? Überlappen sich die Phasen eher? Oder sind sie durch häufige Iterationen innerhalb jeder Phase geprägt und kaum voneinander abgrenzbar?

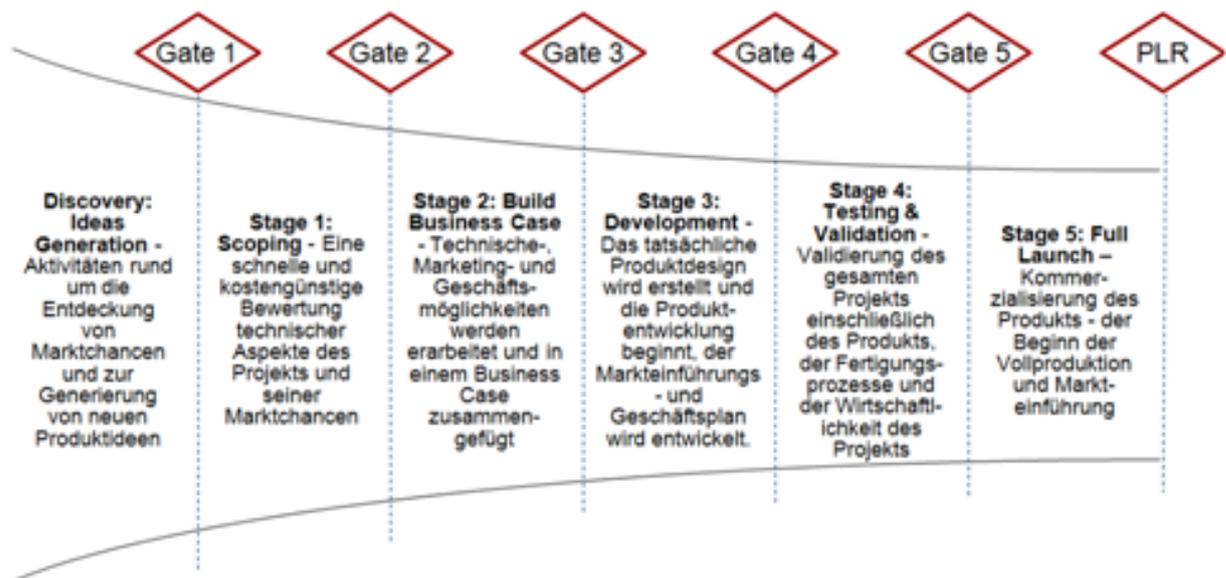


Abbildung 1: Phasenunterteilung und -definition im Stage-Gate Modell (Cooper, 2014)

#### Teil 2 – Einleitende Fragen zu den Führungsanforderungen im Stage-Gate Prozess

- 2.1 Wie würden Sie grundsätzlich Ihr Führungsverhalten gegenüber Ihrem Projektteam im vorliegenden Beispiel charakterisieren?
- 2.2 Bestehen Ihrer Meinung nach grundsätzlich Unterschiede zwischen Ihrem Führungsverhalten zu Beginn eines Projekts im Vergleich zu dessen Ende? Worin bestehen diese Unterschiede?
- 2.3 Können sie beispielhaft erläutern, wie sich diese Unterschiede Ihres Führungsverhaltenes im vorliegenden Projekt gegenüber dem Projektteam grundsätzlich geäußert haben?

### **Teil 3 - Fragen zum Führungsverhalten in den einzelnen Prozessabschnitten**

#### **Beginnend mit der ersten Stage:**

- 3.1 Welche Rolle besaßen Sie als Führungskraft in dieser Phase für Ihr Team?
- 3.2 Welches Verhalten war während dieser Phase insbesondere charakteristisch für Ihre Teamführung?
- 3.3 Inwiefern unterschied sich Ihr Führungsverhalten in dieser Phase von dem der vorhergehenden Phase?

### **Teil 4 - Phasenübergreifende Fragen zum Führungsverhalten im Stage-Gate Prozess**

- 4.1 Änderten Sie Ihr Führungsverhalten unmittelbar vor Gate-Meetings?
- 4.2 Änderten Sie Ihr Führungsverhalten unmittelbar nach Gate-Meetings?
- 4.3 Versuchen Sie durch Ihr Führungsverhalten entlang des Prozesses bewusst die Handlungsfreiräume Ihres Teams zu verändern? Wann und warum tun Sie das?
- 4.4 Versuchen Sie durch Ihr Führungsverhalten in bestimmten Prozessabschnitten bewusst die Handlungsfreiräume Ihres Teams zu verändern? Wann und warum tun Sie das?

**(Bitte erst zur nächsten Seite blättern, wenn Teil 4 abgeschlossen ist)**

### Teil 5 - Fragen zum Führungsverhalten in den einzelnen Prozessabschnitten: Gestützt

In diesem Teil des Interviews möchte ich versuchen mit Ihnen die unten aufgeführten Beispiele über verschiedene Verhaltensweisen, den von Ihnen identifizierten Phasen zuzuordnen (Die wiederholte Nennung der Beispiele ist möglich).

- 5.1 Können Sie die unten aufgeführten Verhaltensweisen insbesondere bestimmten Phasen zuordnen? Handelt es sich eher um konstante Verhaltensweise über den gesamten Projektverlauf? Oder sind die Verhaltensweisen kein Bestandteil ihres Führungsverhaltens? Warum?
- 5.2 Können Sie weitere Beispiele für Verhaltensweisen nennen, die hier noch nicht aufgeführt sind?

**Besonders relevant in Stage/Gate, Anfang/Ende, konstant; nicht relevant:**

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**Ich als Führungskraft...**

1. Lasse unterschiedliche Wege zu, eine Aufgabe zu erledigen.
2. Überwache und kontrolliert Zielerreichung.
3. Ermutige, mit unterschiedlichen Ideen zu experimentieren.
4. Etabliere Routinen.
5. Motiviere, Risiken einzugehen.
6. Greife korrigierend ein.
7. Räume Möglichkeiten für eigenständiges Denken und Handeln ein.
8. Überprüfe die Einhaltung von Regeln.
9. Gebe mehr Raum für eigene Ideen.
10. Achte auf einheitliche Aufgabenerledigung.
11. Toleriere Fehler.
12. Sanktioniere Fehler.
13. Ermutige aus Fehlern zu lernen.
14. Halte mich an Pläne.

### Teil 6 – Fragen zur Innovationsperformance und zum Projekterfolg

- 6.1 Was bedeutet für Sie (für Ihr Unternehmen) Innovationsperformance?
- 6.2 Welche Verhaltensweisen sind Ihrer Meinung nach als Projektleiter für die Erreichung eines erfolgreichen Projektabschlusses besonders wichtig?

## APPENDIX IV: STUDY CONSENT

Tim Voigt

tim.voigt@campus.tu-berlin.de

+49 177 4816 442

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### *University of Twente*

UTwente • Office RA 2117 • P.O.Box 217 • NL-7500 AE Enschede

Dr. Tanya Bondarouk

FACULTY OF BUSINESS  
ADMINISTRATION

DEPARTMENT OF  
HUMAN RESOURCE  
MANAGEMENT

UNIVERSITY OF  
TWENTE.

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### *Technische Universität Berlin*

TU Berlin • Sekr. VW5 - ODW • Straße des 17. Juni 135 • D-10623 Berlin

Prof. Dr. Klaus W. Döring

FACULTY VII  
ECONOMICS AND  
MANAGEMENT

DEPARTMENT OF  
TECHNOLOGY AND  
INNOVATION  
MANAGEMENT



#### **Participation in an interview**

Dear participant,

Thank you very much for your interest in our interview study. This study consent provides further information about the conducted research in cooperation with Technical University of Berlin and the University of Twente. With your signature you confirm that you would like to participate in the interview and have been informed about the following points.

#### **Informed consent**

I have been informed that my participation in this interview study is voluntary. The interview will last between 30 and 45 minutes. The interview will be conducted by the researcher. I am allowed to stop the interview or refuse to answer questions at any time without giving reasons. The interview will be taped so that it can be typed up and properly analyzed. My responses are treated in a confidential manner and will be anonymized in any research reports; this means that my personal identifying information (e.g., my name) will not be reported. In a few months, I will receive a summary report about the results of the study and some additional information about the topics of the study if I write down my email address below. If I have any questions, I may contact Prof. Dr. Klaus W. Döring in Germany (phone number: +49-314-766 34 / -33 and email address: klaus.doering@mailbox.tu-berlin.de) or Dr. Tanya Bondarouk in the Netherlands (phone number: +31-53-489 3666 and email address: t.bondarouk@utwente.nl)

\_\_\_\_\_  
(Date / Signature)

Optional: Email address \_\_\_\_\_

**APPENDIX V: DOCUMENTATION OF INTERVIEWS**

<b>Interview No.:</b>	<b>1</b>
Date of interview:	31.07.2014
Type of interview:	Telephone
Duration of interview:	00:50:28
Language:	German
Seniority:	7 years
Project management experience:	7 years
Stage-Gate experience:	7 years
Project team size:	n.s.
Project duration:	n.s.
Stage-Gate generation:	3 <sup>rd</sup>
<b>Interview No.:</b>	<b>2</b>
Date of interview:	31.07.2014
Type of interview:	Face-to-face
Duration of interview:	01:05:04
Language:	German
Seniority:	22 years
Project management experience:	22 years
Stage-Gate experience:	16 years
Project team size:	n.s.
Project duration:	n.s.
Stage-Gate generation:	Next
<b>Interview No.:</b>	<b>3</b>
Date of interview:	01.08.2014
Type of interview:	Telephone
Duration of interview:	01:04:59
Language:	German
Seniority:	12 years
Project management experience:	11 years
Stage-Gate experience:	n.s.
Project team size:	5 years
Project duration:	5 years
Stage-Gate generation:	3 <sup>rd</sup>
<b>Interview No.:</b>	<b>4</b>
Date of interview:	06.08.2014
Type of interview:	Telephone
Duration of interview:	01:06:45
Language:	German
Seniority:	22 years
Project management experience:	19 years
Stage-Gate experience:	19 years
Project team size:	15 people
Project duration:	n.s.
Stage-Gate generation:	2 <sup>nd</sup>

<b>Interview No.:</b>	<b>5</b>
Date of interview:	08.08.2014
Type of interview:	Telephone
Duration of interview:	01:14:47
Language:	German
Seniority:	15 years
Project management experience:	10 years
Stage-Gate experience:	10 years
Project team size:	8 people
Project duration:	20 month
Stage-Gate generation:	3 <sup>rd</sup>

<b>Interview No.:</b>	<b>6</b>
Date of interview:	12.08.2014
Type of interview:	Telephone
Duration of interview:	00:56:02
Language:	German
Seniority:	15 years
Project management experience:	10 years
Stage-Gate experience:	9 years
Project team size:	10 people
Project duration:	10 years
Stage-Gate generation:	3 <sup>rd</sup>

<b>Interview No.:</b>	<b>7</b>
Date of interview:	13.08.2014
Type of interview:	Telephone
Duration of interview:	00:48:59
Language:	German
Seniority:	5 years
Project management experience:	2 years
Stage-Gate experience:	2 years
Project team size:	16 people
Project duration:	6 month
Stage-Gate generation:	Next

<b>Interview No.:</b>	<b>8</b>
Date of interview:	15.08.2014
Type of interview:	Telephone
Duration of interview:	01:10:30
Language:	German
Seniority:	12 years
Project management experience:	3 years
Stage-Gate experience:	3 years
Project team size:	n.s.
Project duration:	n.s.
Stage-Gate generation:	Next

<b>Interview No.:</b>	<b>9</b>
Date of interview:	15.08.2014
Type of interview:	Telephone
Duration of interview:	00:43:08
Language:	German
Seniority:	6 years
Project management experience:	6 years
Stage-Gate experience:	2 years
Project team size:	35 people
Project duration:	n.s.
Stage-Gate generation:	Next
<b>Interview No.:</b>	<b>10</b>
Date of interview:	19.08.2014
Type of interview:	Telephone
Duration of interview:	00:51:10
Language:	English
Seniority:	21 years
Project management experience:	15 years
Stage-Gate experience:	15 years
Project team size:	12 people
Project duration:	15 month
Stage-Gate generation:	3 <sup>rd</sup>
<b>Interview No.:</b>	<b>11</b>
Date of interview:	19.08.2014
Type of interview:	Telephone
Duration of interview:	00:50:11
Language:	German
Seniority:	10 years
Project management experience:	6 years
Stage-Gate experience:	6 years
Project team size:	n.s.
Project duration:	4 years
Stage-Gate generation:	2 <sup>nd</sup>
<b>Interview No.:</b>	<b>12</b>
Date of interview:	21.08.2014
Type of interview:	Telephone
Duration of interview:	00:54:48
Language:	English
Seniority:	7 years
Project management experience:	30 years
Stage-Gate experience:	4 years
Project team size:	8 people
Project duration:	14 month
Stage-Gate generation:	2 <sup>nd</sup>

<b>Interview No.:</b>	<b>13</b>
Date of interview:	04.09.2014
Type of interview:	Telephone
Duration of interview:	01:03:04
Language:	German
Seniority:	15 years
Project management experience:	12 years
Stage-Gate experience:	11 years
Project team size:	45 people
Project duration:	3 years
Stage-Gate generation:	3 <sup>rd</sup>

<b>Interview No.:</b>	<b>14</b>
Date of interview:	08.09.2014
Type of interview:	Telephone
Duration of interview:	00:56:48
Language:	German
Seniority:	15 years
Project management experience:	6 years
Stage-Gate experience:	5 years
Project team size:	31 people
Project duration:	3 years
Stage-Gate generation:	2 <sup>nd</sup>

<b>Interview No.:</b>	<b>15</b>
Date of interview:	15.09.2014
Type of interview:	Face-to-face
Duration of interview:	01:09:35
Language:	German
Seniority:	10 years
Project management experience:	2 years
Stage-Gate experience:	2 years
Project team size:	40 people
Project duration:	1 year
Stage-Gate generation:	Next

## **APPENDIX VI: FINAL TEMPLATE RESULTING FROM THE TEMPLATE ANALYSIS AND INDICATIONS OF THE RESPECTIVE QUESTIONS FROM THE INTERVIEW GUIDE**

### **Background information**

- Seniority (1.1)
- Project management experience (1.2)
- Stage-Gate experience (1.3)
- Project team size (1.4)
- Project duration (1.4)

### **Stage-Gate generation (1.5, 1.6)**

- 2nd Generation Stage-Gate: Sequential process
- 3rd Generation Stage-Gate: Partial overlapping of stages
- Next Generation Stage-Gate: Heavy overlapping of stages, iterations or spirals

### **Overall leadership behaviors along Stage-Gate (2.1, 3.1, 3.2, 3.3, 4.3, 5.1, 5.2, 6.2)**

- Opening behaviors
  - O: Being flexible on planning
  - O: Encourage exchange of information
  - O: Encourage self dependent task accomplishment
  - O: Give regular feedback to development team
  - O: Giving possibilities for independent thinking and acting
  - O: Giving room for own ideas
  - OO: Allowing different ways of accomplishing a task
  - OO: Allowing errors
  - OO: Encouraging error learning
  - OO: Encouraging experimentation with different ideas
  - OO: Giving possibilities for independent thinking and acting
  - OO: Giving room for own ideas
  - OO: Motivating to take risks
- Closing behaviors
  - C: Determine task completion
  - C: Establishing rules and routines
  - C: Sticking to plans
  - C: Taking corrective action
  - CC: Controlling adherence to rules
  - CC: Establishing routines
  - CC: Monitoring and controlling goal attainment
  - CC: Paying attention to uniform task accomplishment
  - CC: Sanctioning errors
  - CC: Sticking to plans
  - CC: Taking corrective action

### **Start-end-comparison of leadership behavior (2.2, 2.3, 5.1, 5.2)**

- Start of project
  - Opening behaviors
    - O: Being flexible on planning
    - O: Being open for discussion
    - O: Emphasize a loose system of rules
    - O: Encouraging experimentation with different ideas
    - O: Giving room for own ideas
    - O: Motivate to take risks
    - OO: Allowing errors
    - OO: Encouraging experimentation with different ideas
    - OO: Giving possibilities for independent thinking and acting
    - OO: Motivating to take risks
  - Closing behaviors
- End of project

- Opening behaviors
- Closing behaviors
  - C: Allocate tasks
  - C: Establishing rules and routines
  - C: Increasing pressure on team members
  - C: Monitoring and controlling goal attainment
  - C: Sticking to plans
  - CC: Establishing routines
  - CC: Monitoring and controlling goal attainment

**Stage** specific ambidextrous leadership behaviors (3.1, 3.2, 3.3, 4.4, 5.1, 5.2)

- Discovery
  - Opening behaviors
    - O: Being flexible on planning
    - O: Giving possibilities for independent thinking and acting
    - OO: Allowing different ways of accomplishing a task
    - O: Encouraging experimentation with different ideas
    - O: Giving room for own ideas
    - O: Motivate to take risks
  - Closing behaviors
    - C: Establishing rules and routines
- Scoping
  - Opening behaviors
    - O: Being flexible on planning
    - O: Being open for discussion
    - O: Enable team to work more creative
    - O: Encourage exchange of information
    - O: Encouraging experimentation with different ideas
    - O: Giving possibilities for independent thinking and acting
    - O: Giving room for own ideas
    - O: Motivate to take risks
    - OO: Allowing different ways of accomplishing a task
    - OO: Allowing errors
    - OO: Encouraging experimentation with different ideas
    - OO: Giving possibilities for independent thinking and acting
    - OO: Giving room for own ideas
    - OO: Motivating to take risks
  - Closing behaviors
    - C: Controlling adherence of rules and routines
    - C: Establishing rules and routines
    - C: Monitoring and controlling goal attainment
    - C: Setting the project scope
    - C: Sticking to plans
    - CC: Controlling adherence to rules
    - CC: Monitoring and controlling goal attainment
    - CC: Paying attention to uniform task accomplishment
    - CC: Sticking to plans
    - CC: Taking corrective action
- Business Case
  - Opening behaviors
    - O: Being flexible on planning
    - O: Being open for discussion
    - O: Emphasize a loose system of rules
    - O: Encourage exchange of information
    - O: Encourage self dependent task accomplishment
    - O: Encouraging experimentation with different ideas
    - O: Giving possibilities for independent thinking and acting
    - O: Giving room for own ideas
    - O: Promote a vision to increase problem-solving capacity
    - OO: Encouraging error learning
    - OO: Encouraging experimentation with different ideas
  - Closing behaviors
    - C: Allocate tasks
    - C: Controlling adherence of rules and routines
    - C: Determine task completion
    - C: Establishing rules and routines

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- C: Increasing pressure on team members
- C: Monitoring and controlling goal attainment
- C: Sticking to plans
- C: Taking corrective action
- CC: Establishing routines
- CC: Monitoring and controlling goal attainment
- CC: Paying attention to uniform task accomplishment
- CC: Taking corrective action
- Development
  - Opening behaviors
    - O: Allowing errors
    - O: Being flexible on planning
    - O: Being open for discussion
    - O: Enable team to work more creative
    - O: Encourage exchange of information
    - O: Encourage self dependent task accomplishment
    - O: Encouraging error learning
    - O: Encouraging experimentation with different ideas
    - O: Give regular feedback to development team
    - O: Giving possibilities for independent thinking and acting
    - O: Giving room for own ideas
    - O: Initiate problem solving process by questioning
    - O: Promote a vision to increase problem-solving capacity
    - OO: Encouraging error learning
    - OO: Encouraging experimentation with different ideas
    - OO: Giving room for own ideas
    - OO: Motivating to take risks
  - Closing behaviors
    - C: Allocate tasks
    - C: Controlling adherence of rules and routines
    - C: Determine task completion
    - C: Establishing rules and routines
    - C: Increasing pressure on team members
    - C: Monitoring and controlling goal attainment
    - C: Sanctioning errors
    - C: Setting the project scope
    - C: Sticking to plans
    - C: Taking corrective action
    - CC: Controlling adherence to rules
    - CC: Establishing routines
    - CC: Monitoring and controlling goal attainment
    - CC: Paying attention to uniform task accomplishment
    - CC: Taking corrective action
- Testing & Validation
  - Opening behaviors
    - O: Being flexible on planning
    - O: Being open for discussion
    - O: Enable team to work more creative
    - O: Encourage exchange of information
    - O: Give regular feedback to development team
    - O: Giving possibilities for independent thinking and acting
    - OO: Allowing different ways of accomplishing a task
    - OO: Encouraging error learning
    - OO: Encouraging experimentation with different ideas
  - Closing behaviors
    - C: Allocate tasks
    - C: Controlling adherence of rules and routines
    - C: Determine task completion
    - C: Establishing rules and routines
    - C: Increasing pressure on team members
    - C: Monitoring and controlling goal attainment
    - C: Sticking to plans
    - C: Taking corrective action
    - CC: Controlling adherence to rules
    - CC: Establishing routines
    - CC: Monitoring and controlling goal attainment

- CC: Paying attention to uniform task accomplishment
    - CC: Sanctioning errors
    - CC: Sticking to plans
    - CC: Taking corrective action
- Full Launch
  - Opening behaviors
    - O: Encourage exchange of information
    - O: Give regular feedback to development team
    - O: Encouraging experimentation with different ideas
  - Closing behaviors
    - C: Allocate tasks
    - C: Controlling adherence of rules and routines
    - C: Determine task completion
    - C: Establishing rules and routines
    - C: Increasing pressure on team members
    - C: Monitoring and controlling goal attainment
    - C: Sticking to plans
    - C: Taking corrective action
    - CC: Controlling adherence to rules
    - CC: Establishing routines
    - CC: Monitoring and controlling goal attainment
    - CC: Sanctioning errors
    - CC: Sticking to plans
    - CC: Taking corrective action

**Gate** specific leadership behaviors (4.1, 4.2)

- No notable difference
- Opening behaviors
  - O: Give regular feedback to development team
  - O: Giving possibilities for independent thinking and acting
  - O: Initiate problem solving process by questioning
- Closing behaviors
  - C: Allocate tasks
  - C: Controlling adherence of rules and routines
  - C: Monitoring and controlling goal attainment

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## **SATUTORY DECLARATION**

I herewith formally declare that I have written the submitted master's thesis (23.451 words) independently. I did not use any outside support except for the quoted literature and other sources mentioned in the paper.

I clearly marked and separately listed all of the literature and all of the other sources which I employed when producing this academic work, either literally or in content.

I am aware that the violation of this regulation will lead to failure of the thesis.

Frankfurt, 17 November 2014

  
(Tim Voigt)