

## EXPLORATIVE DELPHI STUDY OF:

An organizational climate for the phases of the innovation process



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## TITLE

Explorative Delphi study of:  
An organizational climate for the phases of the innovation process

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# PREFACE

Two years ago I started wondering 'What to do for my master assignment?'. Consulting firm The Bridge, business innovators, gave me the opportunity to start with my research at their office. Whereby the organizational climate for innovation was the research topic of my interest. In investigating the organizational climate for innovation there was a lot of room to make my own choices. What is the focus of the climate to study? How should the design of the study look like? I had the freedom to fill in the answers by myself, resulting in this master thesis. Of course, not without the help of some persons, who I would like to thank here.

First of all, Hans Bakker, director of The Bridge business innovators, for the possibility of conducting a research internship at The Bridge and the support in conducting the Delphi study. Besides Hans Bakker I would also like to thank Wouter van den Burg, management consultant at The Bridge business innovators for his support.

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I am very happy that I can present this thesis to you on this day and complete my Master of Science in Business Administration. It was worth all the effort and giving up my leisure time in a certain period of time. For this, I want to thank my family and boyfriend. Better days are coming, besides my job I am now all yours!

Leonie Broeze

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# 1 INTRODUCTION

## 1.1 Success factors for innovation

Over the years much attention has been drawn to innovation. Innovation is the successful exploitation of new ideas leading to strategic advantages, for example lower costs or being the first (cf. Garcia & Calantone, 2002; Tidd & Bessant, 2009). With innovation offering strategic advantages, companies are interested in how to manage the innovation process from idea generation till the commercialization. What leads to successful innovation? This issue is addressed by academics. Different success factors for innovation have been identified (cf. Cooper & Kleinschmidt, 1995; Griffin, 1997; Ernst, 2002 and Adams, Bessant & Phelps, 2006). Success factors that embody technological and human aspects (cf. Ahmed, 1998; Adams et al., 2006, and Prajogo & Ahmed, 2006). Because to be innovative, just spending more on R&D and providing the necessary resources is not enough. Innovation is for a large part about the people, an innovator morale should be build and sustained (Brenton & Levin, 2012). The organizational culture and structure represents the human aspects of innovation. Studies have demonstrated that these human aspects of innovation influence the level of innovation in organizations (cf. Amabile, Conti, Coon, Lazenby & Herron, 1996; Govindarajan & Trimble, 2010). One factor of the organizational culture and structure that makes a difference for the level of innovation in organizations is the perceived work environment (Adams et al., 2006).

## 1.2 The organizational climate for innovation

This perceived work environment is conceptualized as the organizational climate. The organizational climate focuses on the relationship between people and their social environment; the setting wherein employees act. The organizational climate consists of the things that happen to employees and the things that are around them (Schneider, 2000). The organizational climate construct is commonly defined today as: *'a summary perception or summated meaning that people attach to particular features of the work setting'* (Ostroff, Kinicki and Tamkins, 2003: p. 575). This means that the climate is an abstraction of the work environment. The climate is based on the patterns of experiences and behaviors that people perceive in a situation (Schneider, Bowen, Ehrhart & Holcombe, 2000).

Following the research of Lewin (1951), many scholars have examined the organizational climate construct. Based on research the number of dimensions relevant for the construct has grown. Schneider argued that the way of studying the organizational climate with a list of generic dimensions has no focus and is not very useful for describing organizational situations (Schneider et al., 2000). Schneider (1990) recommended linking the climate to a specific, even strategic, criterion or outcome: a climate *for* something.

Several studies in the innovation management field have linked the organizational climate to innovation (cf. Amabile et al., 1996, Ekvall, 1996 and Anderson & West, 1998). Study results demonstrated that employee perceptions of the climate can predict creativity and innovation (Hunter, Bedell & Mumford, 2007). This study will also investigate the organizational climate for innovation, however from a different perspective: Linking the organizational climate to the phases of the innovation process.

### **1.3 Studying the innovation process**

Definitions of innovation show that innovation is more than a new idea or invention. An idea or invention can only be regarded as innovation when it is implemented (cf. OECD/Eurostat, 2005; Tidd & Bessant, 2009). For product innovation this embodies the introduction on the market. The process from idea or invention to the implementation encompasses different phases. Govindarajan and Trimble (2010) refer to innovation as the process from generating new ideas to committing to them and making the innovation happen. In this definition three phases can be distinguished. This is just one of the subsets of innovation phases that can be found in literature, there is no standard for the innovation process. Nevertheless, three phases are identified as being part of every innovation process: Idea generation, development and value capturing.

Most of the literature on innovation success factors refer to innovation as a generic concept (Somech & Drach-Zahavy, 2013). There are few studies that differentiate between the phases when studying innovation, despite of the differences between phases. Adams, Bessant and Phelps (2006) describe the lack of differentiating between phases for research on the organizational culture and structure. Adams et al. (2006: p. 34) refer to this as: *'a significant gap in innovation measurement that there appears to be no measures that adequately capture or articulate this sense of structural shift'*. With 'this sense of shift' they mean the idea that contrasting culture and structures need to be adopted as an organization moves along the innovation process (Adams et al., 2006; based on the work of Holbek, 1988). Capturing this structural shift for the organizational climate by differentiating between innovation phases is the topic of consideration of this study.



#### 1.4 Research goal and questions

The research goal is:

*Developing a framework of innovation climate dimensions important for the different phases of the innovation process, taking into account the structural shift between phases.*

This research objective leads to the following research question:

*What is the organizational climate for the different phases of the innovation process?*

The central research question can be decomposed into sub questions. The first three sub questions are based on the breakdown of the innovation process into the innovation phases. Following Schneider (1990) the study will explore a climate *for* something, namely a climate *for* idea generation, a climate *for* development and a climate *for* capturing value:

1. Which innovation climate dimensions are relevant for the idea generation phase?
2. Which innovation climate dimensions are relevant for the development phase?
3. Which innovation climate dimensions are relevant for the capturing value phase?

With the answers on the sub questions above the climate dimensions important for the different phases of the innovation process are identified.

We assume that the climate dimensions differ between the phases, because of the structural shift. This assumption needs to be tested, this is why a fourth sub question is added:

4. To what extent differ the three innovation phases in the identified innovation climate dimensions?

With the answers on the sub questions the central research question will be answered. The climate dimensions of importance for the different innovation phases will be identified and the research results will show if and how the structural shift between innovation phases is present for the organizational climate construct. The practical and theoretical relevance of this explorative study on the climate for the whole innovation process will now be discussed.

### **1.5 Practical relevance**

Innovation is seen as the basis of competitive success (Tidd et al., 2009) and thereby gains a lot of attention by practitioners. Study results of McKinsey (2012) and Accenture (2013) show this importance of innovation for business leaders nowadays; innovation is among the top priorities for most companies. In 2012 33% of the global business leaders in the McKinsey study ranked product/ service innovation as their companies' top focus for the next three years and in the Accenture study of last year 70% of the surveyed executives placed innovation in the top five priorities. Organizations want to gain insight into their innovation potential and know how to manage the process of innovation at best. The results of this study will show what climate dimensions play a role in achieving a climate for the individual innovation phases. Information which has value for practitioners, because with this information practitioners are better equipped in what organizational climate should be created for idea generation, development and capturing value.

Further, there is a specific practical relevance for consultancy organization The Bridge, business innovators. Consultancy organizations and government-sponsored institutions saw the need of organizations to gain insight into their innovation potential as a business opportunity. They developed innovation scans to advise companies how to innovate successfully and be more innovative. Examples are the innovation scans of Syntens (2012), SunIdee (2011) and KreaNova (2013). With these scans the organizations try to cover the whole innovation process and identify strengths and weaknesses of the company in question. Consultancy organization The Bridge, business innovators, also has developed an innovation scan. Their scan focuses on the organizational climate for innovation (The Bridge, 2013). In the consultancy work The Bridge perceives the phases as distinct from each other. This makes it for The Bridge important to study the structural shift between the phases for the organizational climate. The study will provide relevant information which can be used by the consultants of The Bridge in their day-to-day work to advise their clients about how to manage the innovation process. Moreover, their innovation scan can be re-assessed based on the results.

### **1.6 Theoretical relevance**

The research results will add new knowledge to the current body of knowledge in the field of innovation management. Adams et al. (2006) described the research gap that this research attempts to fill. In 1988, Holbek already argued that innovating organizations must adopt contrasting structures and climates as they move from the initiation to the implementation phases of innovation (Holbek 1988 according to Adams et al., 2006). However, when looking at existing studies to the organizational climate for innovation most of them refer to innovation as a generic concept (cf. Amabile et al., 1996, Ekvall, 1996 and Anderson & West, 1998). Relatively few studies indicated the phase of innovation under consideration (Hunter et al., 2007). The studies

which mentioned the different phases treated the phases as the moderator or tested to which phase the climate was more related to (Hunter et al., 2007; Bain, Mann & Pirola-Merlo, 2001). None of the conducted studies investigated the dimensions of an innovative work climate for the different innovation phases, although this perspective on the organizational climate for innovation might be of high value. It is possible that there exist climates for the individual innovation phases, instead of one climate for innovation.

Another problem with the current body of knowledge is that most research focused on the initiation phase of innovation. The work of Amabile et al. (1996) is an example hereof. KEYS is well respected and used by other researchers for measuring the organizational climate for innovation (Bessant & Venables, 2008), even though it measures only the organizational climate for creativity. Creativity, coming up with new ideas, is not the same as innovation, it is only a part of innovation (Gurteen, 1998). So, KEYS does not capture the whole innovation process, from generating new ideas to committing to them and making the innovation happen (Govindarajan & Trimble, 2010).

This research will fill the research gap by developing a framework of dimensions of an organizational climate for the whole process of innovation. By exploring the organizational climate for the different phases of the innovation process, a framework will be developed based on a study in which the innovation construct is studied as it should be. The results will show how the organizational climate construct is related to the process view of innovation with the distinction between phases.

## 2 THEORETICAL FRAMEWORK

### 2.1 The innovation process

In literature there is consensus on the idea that innovation can be seen as a process and should be managed as such (Boer & During, 2001). Quotes illustrating this view: Innovation is a process *'whereby new ideas are put into practice'* (Rickards, 1985: p. 10) and *'innovation as the process of turning ideas into reality and capturing value from them'* (Tidd et al., 2009: p. 19). The quotes show that ideas or inventions alone cannot be regarded as innovation, they should also be implemented. The definition of an 'innovation' of the OECD shows this clearly: *"An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations"* (OECD, 2005: p. 46). What the implementation of innovation means in an innovation process depends on if the organization is an adopter or a generator of innovation (Gopalakrishnan & Damanpour, 1997). When an organization is the adopter, the innovation is implemented within the organization. This research focuses on the organization as the generator, whereby the implementation includes the commercialization of new products / services and / or processes.

#### 2.1.1 Phases of the innovation process

In the process of innovation initial ideas follow a sequence of stages or phases. When studying the innovation process researchers do not use the same sequence of phases, different sequences of phases within the innovation process can be found (cf. Crawford, 1983; Wheelwright et al., 1992; Tidd et al., 2009; Maxwell, 2009). In Appendix A the comparison of the sets of phases distinguished by researchers can be found. This list gives an idea of the varying sequences of phases found in literature.

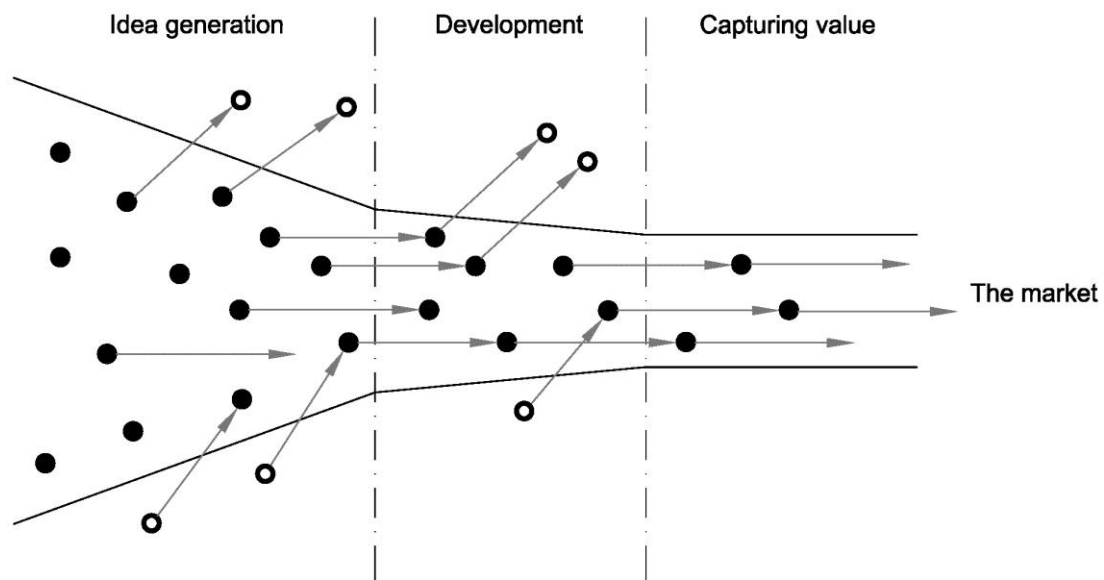
Although there is no commonly used set of phases, two major consistencies do exist in the underlying process. 1. The phases always reflect the nature of innovation as an invention combined with the market introduction of that invention (cf. Garcia & Calantone, 2002; Tidd et al., 2009). 2. The innovation process starts with divergence (gaining a lot of project ideas) and this divergent view on innovation changes in convergence (developing and commercialization a selection of ideas). This process of divergence and convergence is best visualized by the innovation funnel of Wheelwright and Clark (1992) (figure 1). Many project ideas enter the innovation funnel, the best ideas are selected and for these selected ideas a business case has to be completed. The ideas with the best business case will enter the development phase and from the developed ideas only a few will enter the market in the last phase.

Based on the consistencies in the sequences of phases found in literature the innovation process is divided into three phases:

Phase 1: Idea generation – The phase in which new ideas are generated; in the end ideas are selected for further development.

Phase 2: Development – The phase in which the organization makes the innovation happen; the selected ideas are developed and in the end of the phase (some of them) are ready for commercialization.

Phase 3: Capturing value – The phase in which the organization gets the benefits from the innovation; launch of the innovation and first customer sales.



**FIGURE 1:** THE INNOVATION FUNNEL, ADAPTED FROM WHEELWRIGHT AND CLARK (1992), FOLLOWING THE OPEN INNOVATION LOGIC FROM CHESBROUGH (2006)

### 2.1.2 Changing nature of the innovation process

The nature of the innovation process has changed throughout the history (Rothwell, 1992), from closed to open innovation. In the innovation funnel developed by Wheelwright and Clark (1992) the goal is that in the end a project idea leaves the funnel as a successful innovation, whereby all phases are executed internally. This is typical for a closed innovation view, meaning that organisations “*generate their own ideas and then develop them...*” (Chesbrough, 2006: p. XX). In the 90s this view on the innovation process in which all phases should take place within the

organization began to change (Rothwell, 1992). The closed innovation view became outdated and is nowadays replaced by open innovation, a popular innovation management topic from the last decade (Huizingh, 2010).

Open innovation is all about opening up the innovation process (Chesbrough, 2006). This does not mean that the innovation phases are lost. The consistencies in the underlying process of innovation can be combined with open innovation. Whereby open innovation activities can take place in all phases of the process (Lee, Park, Yoon & Park, 2010). Rothaermel and Deeds (2004) found support for an *'integrated product development path leading from exploration alliances, via products in development and exploitation alliances, to products on the market'* (p. 215). The result of a fully completed innovation process remains the same; the introduction of a new product, service or process into the market. The differences between open and closed innovation for the open innovation process are: 1. inflows and outflows are possible in all phases and 2. the innovation process for a specific idea can start or end at every phase (visualized in figure 1). So, open innovation can result in an innovation process in which phases take place within different organizations.

#### 2.1.3 The innovation process and success factors for innovation

The different innovation phases are found in the closed innovation view as well as in the open innovation view. Yet, why is the distinction between phases relevant? In most studies on innovation, scholars refer to innovation as a generic concept and consequently do not differentiate between innovation phases (George, 2007). However, there are researchers who have acknowledged that an organization needs different capabilities in the different phases (Govindarajan & Trimble, 2010; Cooper, 1999). An example of a study which differentiated between innovation phases is the study of Waldman and Bass (1991). They developed a model for the relationship between leadership and the innovation process. The results indicated that for the idea generation phase a nurturing leader role behavior is needed, whereas for the latter stages of innovation a persistent leader role behavior is needed (Waldman et al., 1991). Different leadership capabilities are needed in the innovation phases. This research result shows the relevance of distinguishing between phases in innovation research. From this point of view we will study the organizational climate for innovation.

## 2.2 The organizational climate

Organizational climate has its roots in Lewin's early studies of experimentally created social climates (Ostroff, Kinicki and Tamkins, 2003). Lewin (1951) investigated the influence of leadership styles on the climate and the influence of this climate on the behaviors and attitudes of group members. I.e. Lewin studied how the leadership style influenced the social environment and how this social environment influenced those present in the environment. This relationship between people and their social environment is still present in the organizational climate construct, as it is commonly defined today (Ostroff, Kinicki & Tamkins, 2003: p. 575):

*'A summary perception or summated meaning that people attach to particular features of the work setting'*

What clearly emerges from the definition is that the organizational climate is strongly related to the setting in which employees act; the organizational climate as the things that happen to employees and the things that surround them (Scheider, 2000). The climate is the aggregate of the individual employee perceptions. Schein (2011: p. xi) argues that the organizational climate is *'the result of the various processes of reward and punishment that parents and other authorities provided in the person's environment'*. Based on the organizational structure and practices, of which processes of reward and punishment are part, employees perceive an organization to be 'something'. Certain characteristics are assigned to the organization.

According to Ostroff et al. (2003) the organizational structure and practices are the result of the organizational culture. Culture leads to a set of relevant practices and these practices are perceived by organizational members as rewards or punishments for specific behaviors (Ostroff et al., 2003). So, the organizational climate describes the surface-level manifestations of the environment whereas the organizational culture describes the underlying values and assumptions (Denison, 1996: p. 625). Climate can be considered as the manifestation of culture (Ekvall, 1996), with the organizational structure and practices as the linking mechanism.

The organizational climate is easier to measure and, following the organizational structure and practices, easier to influence than the organizational culture. Climate can be seen as the more malleable subset of the organizational culture (Loewenberger, 2013). This makes it an interesting topic to study, because employee behavior can be influenced by means of the organizational climate.

### 2.2.1 Organizational climate dimensions

Many scholars have examined the organizational climate construct. Over the years authors have defined different sets of dimensions representing the climate within organizations (Denison, 1996: p. 823). Schneider, Brief and Guzzo (1996) made a distinction between four key climate dimensions:

1. The nature of interpersonal relationships (related to the function);
2. The nature of the hierarchy (related to the function);
3. The nature of work (related to the function);
4. The focus of support and rewards (related to the goals of the organization).

These four key dimensions can serve as a reference for framing the dimensions mentioned by other researchers. Specific dimensions can be grouped based on these key dimensions.

In the conceptualization of organizational climate Ostroff et al. (2003: p. 573) mention dimensions as structure, reward, risk, warmth, support, conflict, democraticness, supportiveness, cooperation and cohesion. In studying the relationship between organizational climate configurations and collective attitudes, customer satisfaction and financial performance, Schulte, Shmulyian, Ostroff and Kinicki (2009: p. 621) used climate dimensions covering vision, organizational change, training, career opportunities, recognition, rewards, teamwork and communication. The chosen dimensions by Ostroff et al. (2003) and Schulte et al. (2009) can all be linked to the four key dimensions. E.g. the nature of interpersonal relationships can be described by dimensions as warmth, conflict and communication.

All the dimensions have a relationship with the underlying structure and practices of the organization. For example, the organizational climate dimensions of democraticness and teamwork, related to the key dimension of the nature of the hierarchy, can be determined by asking questions like: 'Are decisions made centrally or through consensus and participation?' and 'Is there a spirit of teamwork or is work more or less individualistic?' (Ahmed, 1998: p. 31). The organizational climate, in this case, is how people perceive the nature of the hierarchy; how they frame the underlying structure and practices. The practices and structure of the organization have an influence on this perception; e.g. the nature of the hierarchy is perceived as centralized when there are policies in place wherein only the top-management can make the decisions and there are no conflicting policies which support decentralization.

### 2.2.2 Climate *for* something

The given examples of sets of dimensions show the richness of the organizational climate construct. There is no consensus on the dimensions to be used when studying the topic. Each time a researcher thought organizational climate might be useful for understanding a phenomenon, new dimensions were proposed (Ostroff et al., 2003). Schneider (1990) argued



that the lack of focus is a problem with organizational climate studies. He proposed a new way of studying the organizational climate by linking the climate to a specific, even strategic, criterion or outcome: a climate *for* something (Ostroff et al., 2003: p. 573). This means that the bandwidth and focus of the climate measure should match the bandwidth and focus of the outcome you want to predict (Schneider, Ehrhart & Macey, 2013). Alvesson (2011) argues that this is the major advance in climate research over the last years: '*the change from an unspecified molar climate to a more focused strategic or process climate*' (Alvesson, 2011: p. 31). This leads us to the climate for innovation.

### **2.3 Organizational climate for innovation**

An organizational climate for innovation is a work setting in which people perceive innovation as a desired and supported organizational objective (adapted from Adams et al. 2006: p. 33). When an organizational climate for innovation exists, the collective attitudes and behaviours of the group members will focus on making innovation happen. Within the work environment people are so comfortable with innovation that they create it (Ahmed, 1998). In the end, this will influence organizational outcomes. That is why linking the organizational climate to innovation as the strategic outcome is important. The consequences the climate has in the workplace make the organizational climate for innovation an important organizational success factor for innovation. The climate can even be seen as an organizational complementary asset or capability needed for commercial success (Teece, 1986).

There are different examples of studies that focus on the link between the organizational climate and a specific outcome (cf.: Scheider, Brief & Guzzo, 1996; Schneider, Gunnarson & Niles-Jolly, 1996; Zohar, 2000). Also in the field of innovation there are studies conducted to the climate for innovation. These studies have identified different dimensions of an organizational climate for innovation, all grasping a part of innovation. The operationalization of innovation in the studies differs. Roughly studies can be divided into two groups: 1. the climate for creativity and 2. the climate for adopting innovation. A selection of studies for both groups will be discussed. The selected studies are studies often referred to by other scholars in their operationalization of the organizational climate for innovation.

#### **2.3.1 The climate for creativity**

*Siegel and Kaemmerer (1978)*

Siegel and Kaemmerer (1978) identified five dimensions that characterize innovative organizations. An innovative organization was defined as '*... one that fosters the creative functioning of its members.*' (p. 554). Opposed to the innovative organization, Siegel and Kaemmerer (1978) defined the traditional organization as '*.... one that is not specifically oriented toward fostering the creative functioning of its members.*' (p. 554). The five identified dimensions

are: 1. leadership, 2. ownership, 3. norms for diversity, 4. continuous development and 5. consistency. After factor analyses three dimensions are left: 1. support for creativity, 2. tolerance of differences and 3. personal commitment. In innovative organizations these dimensions of the organizational climate were present.

Scott and Bruce (1994) used the dimensions of support for creativity and tolerance of differences in their study to innovative behavior. They found prove for a positive relationship between the degree to which individuals perceive dimensions of the organizational climate as supportive of innovation and their innovative behavior. Innovative behavior was tested by types of behaviors, related to generating ideas, seeking sponsorship for ideas and preparing the implementation of ideas (Scott & Bruce, 1994). They concluded that a climate which supports innovation, by flexibility, encouragement and tolerance for change, influences innovative behavior (Scott & Bruce, 1994: p. 601).

Whereas Siegel and Kaemmerer (1978) did not mentioned different innovation phases, Scott and Bruce (1994) did. However, they relate the innovation phases to the measurement of innovative work behavior, instead of the measurement of the climate for innovation. Both studies grasped only a part of the climate for innovation, because the distinction between innovative and not innovative organizations was based on fostering of the creativity side of innovation.

#### *Amabile et al. (1998)*

Amabile et al (1998) conducted more than two decades of research focused on the link between the work environment and creativity. Based on experiments, interviews and surveys they identified six categories of innovation dimensions: 1. challenge, 2. freedom, 3. resources, 4. work-group features, 5. supervisory encouragement and 6. organizational support (Amabile, 1998). Based on these categories Amabile et al. (1996) designed an assessment tool, named 'KEYS', consisting of eight organizational climate dimensions for creativity (Culpepper, 2010): 1. freedom, 2. challenging work, 3. managerial encouragement, 4. work group supports, 5. organizational encouragement, 6. lack of organizational impediments, 7. sufficient resources and 8. realistic workload pressure.

The work of Amabile and colleagues has been used by other researchers for studying the climate for innovation (Bessant & Venables, 2010). However, when studying the work environment the focus was on creativity, which is only a part of innovation (Gurteen, 1998). Because of the focus on the organizational climate for creativity, the research program of Amabile grasped only the invention side of innovation. While creativity is only the starting point of innovation, '*a necessary but not sufficient condition*' (Amabile, 1996: p. 1).

### 2.3.2 The climate for adopting innovation

In contrast to the first group of studies, the studies which now will be discussed have a broad view on innovation.

#### *Ekvall (1996)*

Ekvall (1996) examined the organizational conditions that stimulate or hamper creativity and innovation. Based on the results of several large-factor analytic studies Ekvall (1996) arrived at the climate for innovativeness covering ten dimensions: 1. challenge, 2. freedom, 3. idea support, 4. trust/openness, 5. dynamism/ liveliness, 6. playfulness/ humour, 7. debates, 8. conflicts, 9. risk taking and 10. idea time. These dimensions are the foundation for the Situational Outlook Questionnaire, developed by Isaksen (2007).

Opposed to the work of Siegel & Kaemmerer (1978) and Amabile et al. (1996) in the work of Ekvall and Isaksen innovation is not only about fostering creativity. In the study of Ekvall creativity and innovation refer to innovativeness as '*the ability of an organization to adapt itself and its operations to new demands from its environment....*'. It is about a climate that supports change, innovation and creativity; '*....the readiness, willingness and ability of the context to accept and embrace change*' (Isaksen, 2007: p. 455). This is a broader view on innovation than the development of new products / services and/or processes. The focus is on the organization as the adaptor of innovation, it is not the organization which creates innovations, it is the organization which innovates.

#### *Anderson and West (1998)*

Anderson and West (1998) also studied the organizational climate for innovation from the perspective of the organization or work group as the adopter of innovation. They defined innovation as '*The intentional introduction and application within a role, group or organization of ideas, processes, products or procedures, ....*' (West & Farr, 1989: p. 16). By reviewing the organizational climate and work group innovation literature they arrive at four innovation climate dimensions: 1. vision, 2. participative safety (i.e. team participation and safety), 3. task orientation (climate for excellence and constructive controversy) and 4. support for innovation. Support for innovation incorporates the extent to which time, practical support, cooperation and resources are given to team members to implement new ideas and proposals. According to Anderson and West (1998) these four dimensions are part of the facet-specific climate for innovation within groups at work.

Somech and Drach-Zahavy (2013) used the dimensions of Anderson and West (1998) in the operationalization of the climate for innovation in their study to team innovation. Somech and Drach-Zahavy investigated innovation as a process, differentiating the creativity from the

implementation phase. The study tested the moderating role of the climate for innovation. Somech and Drach-Zahavy (2013) found support that '*Climate for innovation (vision, participative safety, task orientation and support for innovation) moderates the relationship between team creativity and team innovation implementation, such that team creativity is positively associated with innovation implementation only under high levels of climate for innovation*' (p. 702). They concluded that the climate for innovation is a complementary asset, which influences the conversion of team creativity into innovation implementation. An interesting research finding from the perspective of the organization as the adopter. However, it does not provide information on the possible changing nature of the organizational climate for innovation for the different innovation phases. It only places the climate between the phases of team creativity and team innovation implementation.

#### **2.4 Relationship between the climate for innovation and the innovation process**

The selected studies show that many climate dimensions are related to the organizational climate for innovation. However, in none of the described studies the climate for innovation is investigated for the whole innovation process in which invention and commercialization are incorporated. The first group of researchers links the organizational climate to creativity, related to the invention side of innovation. This focus on creativity is not surprising, it reflects the focus of companies on creativity when speaking about innovation. Govindarajan and Trimble (2010) mention in their book 'the other side of innovation' the "*off-balance approach to innovation that is commonplace in corporations around the world.*" Whereby "*There is too much emphasis on ideas, not nearly enough emphasis on execution.*" (Govindarajan & Trimble, 2010: p. 3). There is research needed which covers also the organizational climate for 'the other side of innovation', the process phases after idea generation, from the perspective of the organization as the generator of innovation.

Besides grasping only a part of the climate for innovation, studies do not distinguish between phases when studying the organizational climate. Of the described studies, Scott and Bruce (1994) and Somech and Drach-Zahavy (2013) are the only researchers mentioning the different innovation phases. However, they did not investigate the organizational climate for the different innovation phases. This is a new perspective in studying the organizational climate for innovation, which will be the focus of this study. Based on the described findings on the innovation process and the organizational climate for innovation we expect that the dimensions for the innovation phases differ. Instead of one organizational climate for innovation, the expectation is that the study will result in different organizational climates; an organizational climate for idea generation, an organizational climate for development and an organizational climate for capturing value. An explorative study will now be conducted to test if there exist different climates for the individual innovation phases.

### 3 METHODS

In this study the relationship between the construct of the organizational climate for innovation and the different phases of the innovation process is explored. Delphi is chosen as the explorative research method. Delphi makes use of experts' opinions and can be defined as *'....a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole, to deal with a complex problem'* (Linstone & Turoff: 1975: p. 3). In the next sections we will elaborate on the Delphi method and the Delphi process used in this study.

#### 3.1 The Delphi method

The origins of the Delphi method lie in the defense research. In the 1950's Rand Corporation started an Air Force-sponsored study concerning the use of expert opinion (Dalkey & Helmer, 1963). The usage of an expert panel is the core of Delphi, hence Delphi as name, referring to the Greek Oracle of Delphi. What the Delphi method tries is *'...to obtain the most reliable consensus of opinion of a group of experts'* by *'...a series of intensive questionnaires interspersed with controlled opinion feedback'* (Dalkey & Hemler, 1963: p. 458). With the Delphi interaction process a shared reality will be produced (Scheele, 1975). In 1983, Riggs described the typical Delphi procedure, shown in figure 2. The process shows the goal of obtaining a consensus from the expert panel, a typical Delphi process continues until consensus has been reached.

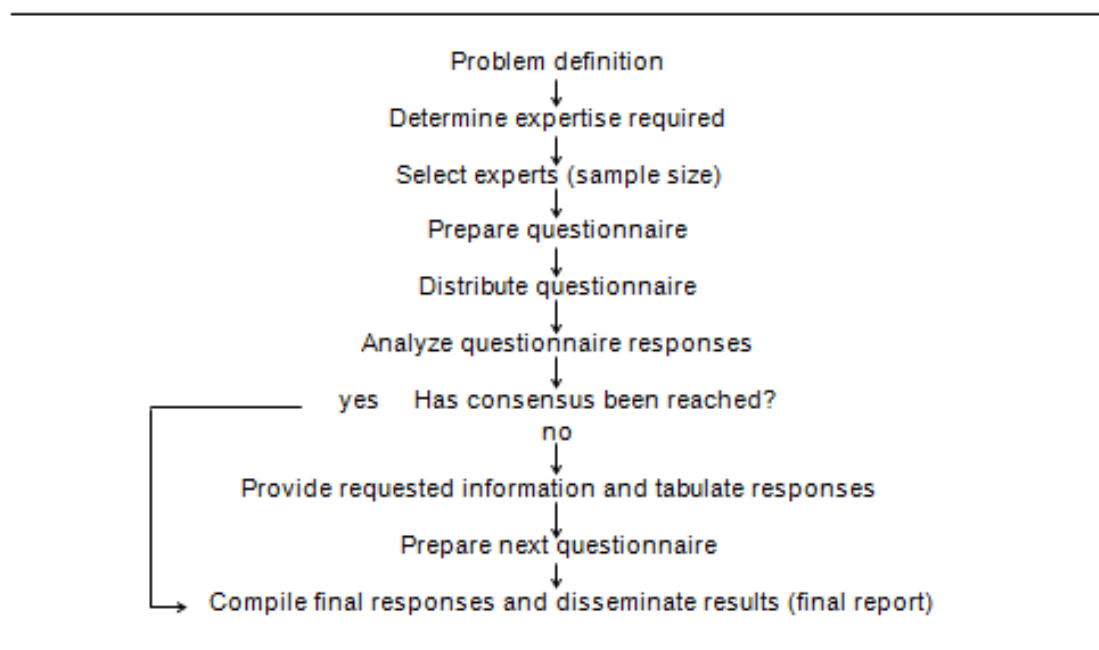


FIGURE 2: FLOWCHART OF A TYPICAL DELPHI STUDY, ADAPTED FROM RIGGS (1983: P. 90)

After the introduction of the method in the defense area, researchers gained interest in the method for usage in forecasting. Forecasting has become a major area of application of the method (Linstone & Turoff, 1975; Paliwoda, 1983; Schmidt, 1997). Delphi has also found application in the management science, as a way to incorporate subjective information into evaluation models (Linstone & Turoff, 1975: p. 11). Besides the usage in forecasting and evaluation models Delphi can be applied in a different way.

Päivärinta, Pekkola and Moe (2011) recommend the Delphi method for exploratory research in emerging research areas. They connect Delphi with grounded theory. Grounded theory is the discovery of theory from data systematically obtained from social research (Glaser & Strauss, 1967: p. 2). In this research we want to discover the dimensions of an organizational climate for innovation for the individual innovation phases. Delphi is the method by which we will systematically obtain the data.

### **3.2 Suitability of Delphi for the research**

Delphi is not the only method suitable for discovering theory from qualitative data. The choice for the Delphi method is based on the considerations of a. the nature of the problem, b. consensus and interaction within an expert group and c. practical feasibility.

#### *a. Nature of the problem*

Delphi is a method to deal with complex problems (Linstone & Turoff, 1975). Identifying the dimensions that are important for the organizational climate for the innovation phases is the 'complex problem' in this study. It is an explorative study, in this new field opinions of experts need to be collected.

#### *b. Consensus and interaction within an expert group*

As included in the definition, Delphi structures the communication process of a group of individuals. The expectation is that people will have different views on the dimensions, based on their experiences with innovation management. A Delphi survey is a suitable method to arrive at a general framework in the end.

One could ask: 'Why Delphi and not a group discussion?'. Delphi offers anonymity for the participants. In this way they are free to express their opinion. The survey is the mode of interaction and feedback is given indirectly. When participants do not meet each other groupthink, with effects as the bandwagon effect, can be avoided (Linstone & Turoff, 1975). The bandwagon effect means that when the majority of a group believes in something, others tend to conform to this belief. With Delphi there is no way in which the answers of the experts can

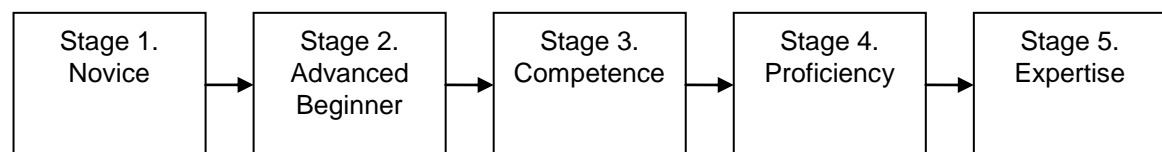
influence each other. Delphi overcomes the problems of interacting groups. Hence, no other group communication process can elicit the same data from experts.

### *c. Practical feasibility*

Experts do not have unlimited time to participate in research projects. It would be impossible to arrange group meetings where all experts can be present. With an online Delphi survey experts can choose when they want to fill out the questionnaire. This gives the respondent flexibility. Further, experts do not need time for travelling, with the result that the total amount of time a participant has to spend on the research is limited.

### **3.3 The required expertise: What is an expert?**

The goal of the Delphi method is to reach consensus in opinions within a group of experts. It can be said that the research population is 'experts on the topic of consideration', but what makes someone an expert? A proper operationalization of the expert concept is needed before the sample of experts can be chosen. For the Delphi study we need respondents with expertise in a particular field, the field of innovation management. Dreyfus and Dreyfus (2005) developed a five-stage model of skill acquisition (figure 3).



**FIGURE 3:** THE FIVE-STAGE MODEL OF THE EXPERTISE ACQUISITION, ADAPTED FROM DREYFUS AND DREYFUS (2005)

The difference between proficiency and expertise lies in knowing how to achieve the goal (Dreyfus & Dreyfus, 2005). Both groups, proficient performers and experts, see what needs to be done. The difference lies in knowing how to achieve the goal, the expert sees this immediately, whereas the proficient performer needs to make a decision on how to do it. The expert distinguishes itself further from the proficient performer through '*... the ability to make more subtle and refined discriminations ...*' (Dreyfus & Dreyfus, 2005: p. 787).

We are searching for experts in the field of innovation management who have reached this last stage, the stage of expertise. The experts are selected for their perceived expertise on the research topic. In this research specific practitioners are regarded as experts. A practitioner is an expert when he or she is able to manage the innovation process well. It takes time to become an expert (Ericsson, Prietula & Cokely, 2007), ten years of work experience was set as the minimum. When a practitioner has seen and/or managed a broad range of innovation projects in these ten or more working years, he or she will reach the expertise stage. Broad refers, in this regard, to several innovation projects whereby the practitioner had to do with the different phases

of the innovation process. Because of the experience in the innovation management field, the expert can make subtle and refined discriminations and will know what influences the success of innovations. Based on the theory of Dreyfus and Dreyfus (2005) expert is for this study operationalized as:

*A practitioner with at least ten years of work experience, whereby he or she has experience in managing or monitoring a broad range of innovation processes.*

### 3.4 Data collection

In selecting the respondents, the operationalization of the expert was used as the criterion. 45 experts were contacted, of whom 25 responded positively. These experts received the first Delphi survey. 18 experts completed this first survey, a response rate of 72%. 14 experts completed the second and final Delphi survey, a response rate of 78%. For the Delphi method, it is not the statistical power on which the group size depends, it is the size with the highest chance on arriving at a consensus covering most of the important issues. This is why literature recommends 10 – 18 experts on a Delphi panel (Okoli & Pawlowski, 2004). 14 falls within the recommended size of a Delphi panel.

A modified Delphi approach is used in management research to shape a group consensus about the relative importance of issues (Delbecq, Van de Ven & Gustafson, 1975). This approach of Delphi is termed the “ranking-type” Delphi, wherein key issues about a topic are identified and ranked. Schmidt (1997) described a method for the ranking-type Delphi survey, wherein the data collection is characterized by three distinct stages, shown in figure 4. The process starts with asking broad questions, encouraging respondents to list as many issues as possible. In the second stage the researcher sends a randomly ordered, consolidated list from the first stage. The participant should select the most important issues from this list. In stage three the respondents are asked to rank issues, based on the issues identified to be the most important in stage 2 (Schmidt, 1997).

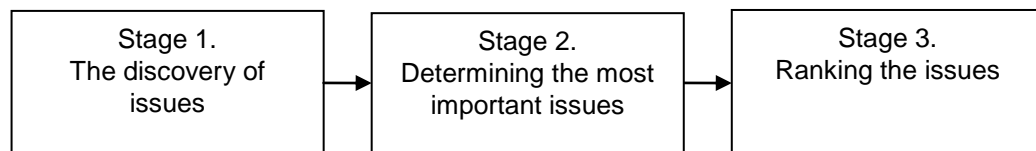


FIGURE 4: DATA COLLECTION STAGES OF THE RANKING-TYPE DELPHI SURVEY (SCHMIDT, 1997)

The first stages of the approach of Schmidt (1997) were performed. In this study Delphi round one refers to stage 1 of Schmidt: The discovery of issues. Delphi round two refers to stage 2 of Schmidt: Determining the most important issues.



### *Delphi round one*

Respondents were asked to respond to the following open-ended questions related to the climate for innovation:

Question 1: What do you consider as a climate supporting idea generation?

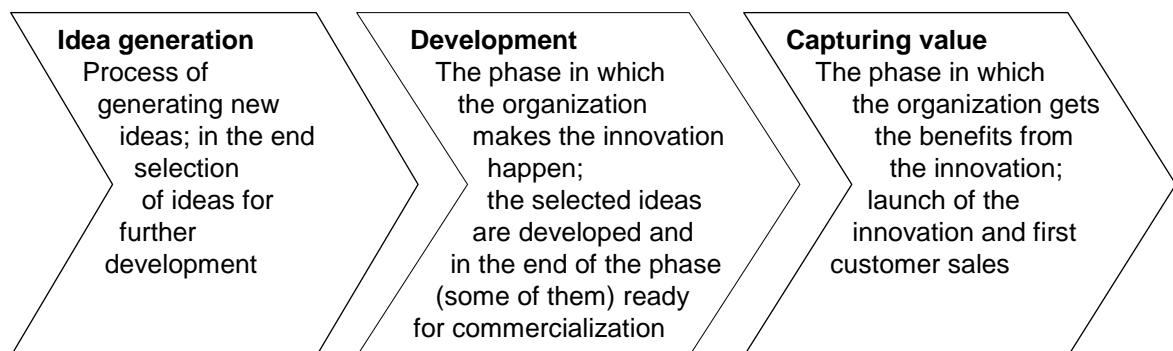
Question 2: What do you consider as a climate supporting innovation development?

Question 3: What do you consider as a climate supporting capturing value from innovation?

With the description of an organizational climate (for innovation) as:

*‘Employees’ shared perceptions of organizational events, practices, and procedures’*, it is about *‘the descriptions of the things that happen to employees in an organization’*. A climate for innovation represents *‘employees’ shared perceptions that support innovation’*.

The definitions of the three innovation phases were also given. The operationalization of the phases follows the result of the literature review on the innovation process:



**FIGURE 5: OPERATIONALIZATION OF THE PHASES OF THE INNOVATION PROCESS**

The completion of the first Delphi round by 18 experts resulted in a list of twenty-eight dimensions of an organizational climate for innovation. The list was generated by analysis of the answers by coding. The given answers were broken down into fragments and those fragments were grouped. Duplicates were removed and together with consultants of The Bridge the list of twenty-eight elements of an organizational climate was composed. This list formed the basis for the second Delphi round.

### *Delphi round two*

In the second Delphi round the list with elements was presented to the expert panel. The experts were asked to select the ten most important elements of the twenty-eight dimensions for: a. the idea generation phase, b. the development phase, and c. the capturing value phase. The list can

be found in Appendix B, the score form in Appendix C. Before sending the second round, the design of the round was reviewed by an independent expert, not participating in the Delphi panel.

With the completion of the second and final Delphi round by 14 experts the research question could be answered. The summary of the findings were sent to the experts after the analysis of the study results. The results of the analysis of the two Delphi rounds is presented in the next chapter, we will now first describe how the analysis was conducted.

### **3.5 Data analysis**

To identify the innovation climate dimensions relevant for the different phases of the innovation process a cut-off point for within-group agreement is set. LeBreton and Senter (2008) argue that the cut-off point should be based on the particular research question and composition model of a researcher. A cut-off point of .50 is chosen. When half or more of the expert panel mentioned a dimension for an innovation phase in the first Delphi round or chose a dimension for an innovation phase in the second Delphi round the dimension is regarded as relevant for the phase. Based on the number of respondents this implies for round one nine or more respondents should have mentioned a dimension and for round two seven or more respondents should have chosen a dimension.

Besides identifying the innovation climate dimensions relevant for the phases of the innovation process the goal of the study is to show if and how the innovation climate differs for the idea generation phase, development phase and capturing value phase.

To test if the organizational climate for the innovation phases differs logistic regression is used. Logistic regression is multiple regression with predictor (independent) variables that are continuous or categorical and an outcome (dependent) variable that is categorical (Field, 2009). In this research the dependent and independent variable are both categorical. The predictor variable is the innovation phase, with three categories; the three innovation phases. The outcome variable is the climate dimension, with twenty-eight dimensions; the in the study identified twenty-eight innovation climate dimensions. Because we want to predict membership of more than two categories (even twenty-eight categories) multinomial logistic regression is used. Multinomial logistic regression tests the influence of the phases in explaining the variability of the importance of the twenty-eight dimensions. Depends the frequency for the twenty-eight dimensions on the innovation phases? The phases explain a significant amount of the variability in the frequency when the  $p$ -value is less than 0.05.

Besides logistic regression, log-linear analysis is used to test if the selection of experts for the most important dimensions differs statistically for the three phases. Log-linear analysis tests

interactions between more than two variables based on a contingency table, whereby the contingency table contains the number of cases that fall into each of the combination of categories (Field, 2009). In this study we have three variables, the three innovation phases. The analyzed contingency table consists of the times an expert selected the same organizational climate dimension for the different innovation phases. In other words, how many times a dimension falls into the top ten of climate dimensions for all phases, or for two, one or none of the phases.

When the contingency table meets the assumptions of no expected counts less than 1 and no more than 20% less than 5 the log-linear analysis can be conducted (Field, 2009). Log-linear analysis will test if the expected frequencies are significantly different from the observed frequencies. The output of the analysis will show interactions between the three phases (idea generation x development x capturing value) and the interactions between two phases (idea generation x development, idea generation x capturing value and development x capturing value). When the  $p$ -value of an interaction is less than 0.05 there is a statistically significant difference, which means that the observed frequencies differ from the expected frequencies. For this research a statistically significant difference shows that experts have chosen different organizational climate dimensions for the individual innovation phases.

Besides testing the differences between the selected dimensions of an organizational climate for the innovation phases in general, we are interested in differences between phases on the level of the individual climate dimensions. To test if the importance of an innovation dimension for the innovation phases differs significantly Cochran's Q is applied. Cochran's Q is a statistical test for  $k$  ( $>2$ ) matched samples and tests the hypothesis that the related dichotomous variables have the same mean (Sheskin, 2004). It compares the distributions of the variables. For this research Cochran's Q is suitable because we have the same qualitative (dichotomous) variable that is measured three times from the same sample. The three phases of the innovation process ( $k = 3$ ) are the matched samples and the Cochran's Q tests if the binary answers of the experts on the individual twenty-eight dimensions have the same mean. Cochran's Q tests the hypotheses:

H<sub>0</sub>: The frequencies (or proportions) of responses on the importance of the dimension\* for the organizational climate for innovation is the same across the innovation phases.

H<sub>a</sub>: The importance of the dimension\* for the organizational climate for innovation differs across the innovation phases.

\*The dimension is one of the twenty-eight dimensions of an organizational climate for innovation. For example, with 'top-management support' as the dimension H<sub>0</sub> would be: *'The frequencies (or proportions) of responses on the importance of top-management support for the organizational climate for innovation is the same across the innovation phases'*

When the  $p$ -value is less than 0.05 the result is statistically significant and H<sub>0</sub> is rejected.

When the importance of a dimension differs significantly pairwise comparisons are made with the McNemar test, to test if the importance of a dimension differs significantly between a) the idea generation phase and the development phase, b) the idea generation phase and the capturing value phase, and c) the development phase and the capturing value phase. With McNemar the mean of two related dichotomous variables is tested (Field, 2009). Again, the significance level is set at 0.05 ( $p\text{-value} < 0.05$ ).

## 4 ANALYSIS

### 4.1 The idea generation phase

#### *Delphi round one*

From the list of the twenty-eight dimensions, composed from the answers on the three open-ended questions in Delphi round one, twenty-four dimensions were identified in the answers on the question 'What do you consider as a climate supporting idea generation?'. The dimensions of flexibility, having a clear process, setting clear expectations and evaluation were not mentioned as climate dimensions supporting idea generation. In total 101 times one of the twenty-four dimensions was identified in the answers of the expert panel, an average of 5,94 per expert.

Top-management support was the most frequently mentioned dimension. Of the eighteen respondents who completed Delphi round one, half of the expert panel referred to top-management support in their answer. Only for top-management support the within-group agreement in round one was high enough (cut-off point of .50) to consider it as a dimension of a climate for idea generation.

#### *Delphi round two*

In Delphi round two the respondents were asked to choose ten dimensions from the list of twenty-eight dimensions composed from the answers given in round one for all the three phases. The within-group agreement was much higher in the second round. Seven dimensions were chosen by more than half of the experts.

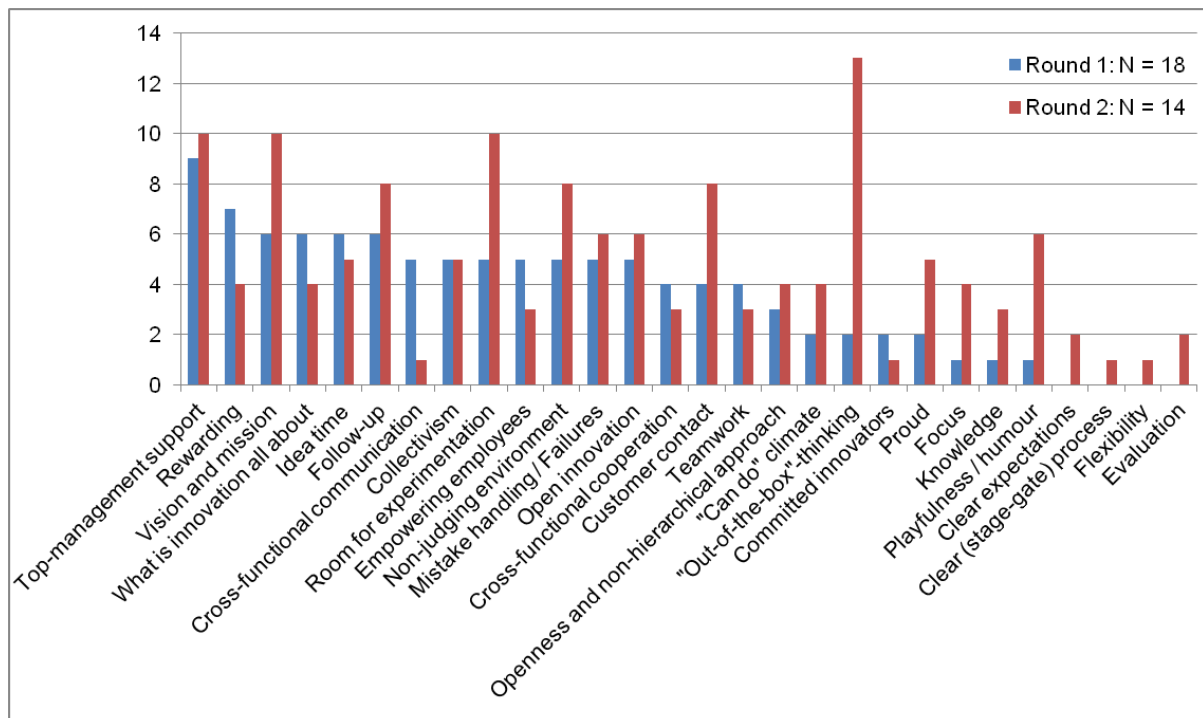
The results of the two Delphi rounds for the innovation climate dimensions with a within-group agreement of .50 or more are summarized in Table 1. These dimensions of the climate for idea generation will be incorporated in the framework, presented in Table 4 on page 35.

**TABLE 1: DIMENSIONS OF A CLIMATE SUPPORTING IDEA GENERATION**

Round 1		Round 2	
Dimension	#	Dimension	#
Top-management support	9	'Out-of-the-box' thinking	13
		Top-management support	10
		Vision and mission	10
		Room for experimentation	10
		Follow-up	8
		Non-judging environment	8
		Customer (market) contact	8

With N = 18 in round 1 and N = 14 in round 2, # = frequency of the mentioned / chosen dimension

The distribution of the answers on the twenty-eight dimensions in the two Delphi rounds is presented in Figure 6. The pattern of the graph and the differences between the answers of the experts in the Delphi rounds shows the importance of the choice for the Delphi method. An example is 'out-of-the-box' thinking. In the first Delphi round only two experts mentioned this dimension in their answer, whereas in the second Delphi round 13 from the 14 experts selected the dimension. Another remarkable difference between the first and second round is the difference for the dimension cross-functional communication. In the first round five experts mentioned cross-functional communication in their answer, whereas only one expert selected the dimension in the second round. These results indicate that some dimensions are observed as manifest dimensions and other dimensions are observed as latent dimensions. To identify both, the manifest and latent dimensions, Delphi seems a relevant research method.



**FIGURE 6:** SCORE OF THE DIMENSIONS OF A CLIMATE FOR IDEA GENERATION FOR THE TWO DELPHI ROUNDS, GRAPH ARRANGED FROM THE MOST MENTIONED DIMENSION IN ROUND 1 TILL THE LEAST MENTIONED.

Based on the presented results an organizational climate for idea generation can be described. When an organizational climate for idea generation is present employees perceive the work environment as an environment in which: Out-of-the-box thinking is encouraged and accepted. Top-management shows interest, is committed to and enthusiastic for innovation. The vision, mission and the ambition to reach certain goals (related to innovation) are shared within the organization. There is room to explore freely and undertake other activities than the 'normal' activities within the organization. Something is done with the ideas and work is actively followed-

up. One can come up with new ideas/ developments without being judged, whereby the group norms focus on 'what is good about it?' instead of 'why is it impossible?'. Further, employees feel it is important to analyze the market and stay in contact with the market / customers.

## 4.2 The development phase

### *Delphi round one*

From the list of the twenty-eight dimensions, composed from the answers on the three open-ended questions in Delphi round one, twenty-three dimensions were identified in the answers on the question 'What do you consider as a climate supporting innovation development?'. The dimensions of proud, playfulness, open innovation, follow-up and evaluation were not mentioned as climate dimensions supporting idea generation. In total 79 times one of the twenty-three dimensions was identified in the answers of the expert panel, an average of 4,65 per expert.

Top-management support was the most frequently mentioned dimension. Like the first phase, half of the expert panel referred to top-management support in their answer. Hence, only for top-management support the within-group agreement was high enough (cut-off point of .50) to consider it as a dimension of a climate for the development of innovation.

### *Delphi round two*

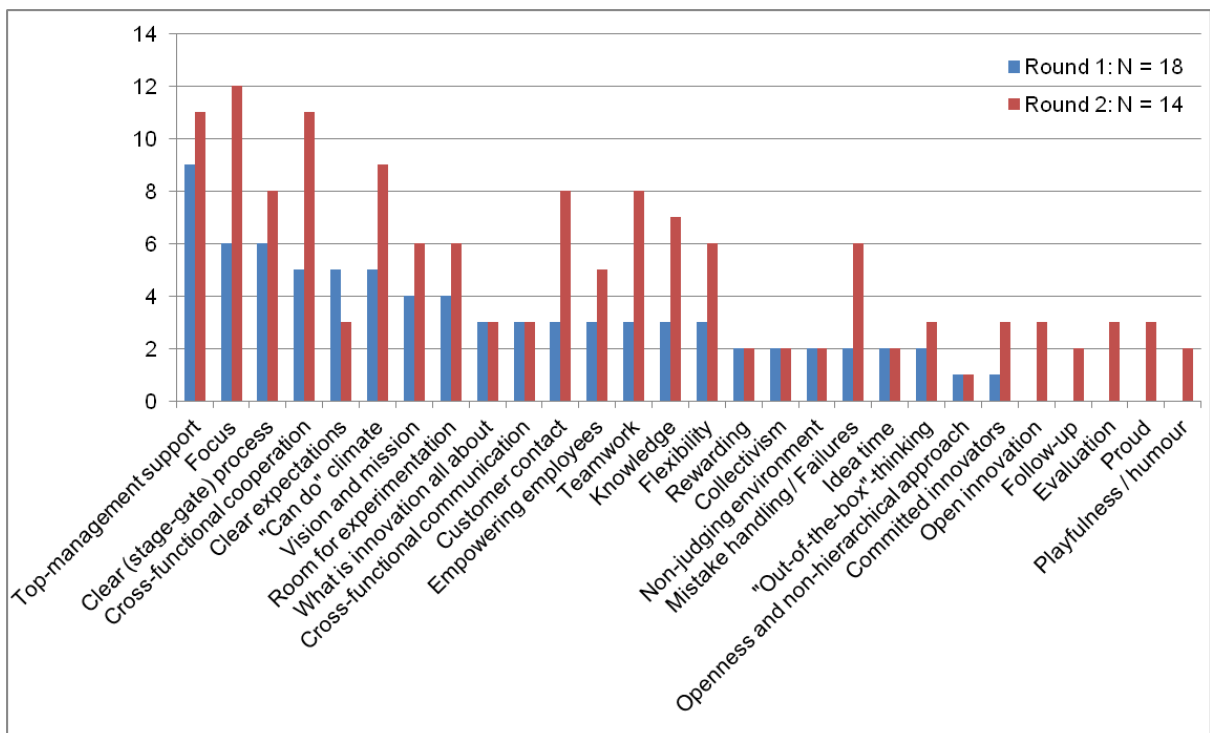
In Delphi round two there was also for the development phase a higher within-group agreement. Eight dimensions were chosen by half or more of the experts, presented in Table 2. These dimensions of an organizational climate for development will be incorporated in the framework, presented in Table 4 on page 35.

**TABLE 2: DIMENSIONS OF A CLIMATE SUPPORTING INNOVATION DEVELOPMENT**

Round 1		Round 2	
Dimension	#	Dimension	#
Top-management support	9	Focus	12
		Top-management support	11
		Cross-functional cooperation	11
		"Can do" climate	9
		Clear (stage-gate) process	8
		Customer (market) contact	8
		Teamwork	8
		Knowledge	7

With N = 18 in round 1 and N = 14 in round 2, # = frequency of the mentioned / chosen dimension

The distribution of the answers on the twenty-eight dimensions in the two Delphi rounds is presented in Figure 7. This graph shows no outlier as 'out-of-the-box' thinking for the idea generation phase. For the dimensions of focus and cross-functional cooperation the frequencies of the answers differ the most between the Delphi rounds. Further, it is worth noting that the experts mentioned the dimension of clear expectations five times in Delphi round one and have chosen it only three times in the top ten of the most important elements. Again, this figure proves the value of the Delphi method. Asking experts more than once does matter.



**FIGURE 7:** SCORE OF THE DIMENSIONS OF A CLIMATE FOR THE DEVELOPMENT OF INNOVATION., GRAPH ARRANGED FROM THE MOST MENTIONED DIMENSION IN ROUND 1 TILL THE LEAST MENTIONED

Based on the presented results an organizational climate for development can be described. When an organizational climate for the development of innovation is present employees perceive the work environment as an environment in which: They know on what projects they should focus, and the focus is on the realization of these projects, with a strict mindset. Top-management shows interest, is committed to and enthusiastic for innovation. Cross-functional cooperation and teamwork are supported and the willingness for cross-functional cooperation and teamwork is high. Employees are motivated to follow their ideas and make them happen. They also feel that they can make them happen, because there are resources available to support this. Further, within an organizational climate for innovation development the (development) process is seen as a clear process with gates and gate criteria. Hereby, employees feel it is important to analyze the market and stay in contact with the market /



customers. And the employees know a lot about new technologies and developments. Product / service related knowledge is available and accessible and the knowledge is shared.

### 4.3 The capturing value phase

#### *Delphi round one*

From the list of the twenty-eight dimensions, composed from the answers on the three open-ended questions in Delphi round one, twenty-two dimensions were identified in the answers on the question 'What do you consider as a climate supporting capturing value from innovation?'. The dimensions idea time, follow-up, committed innovators, proud and playfulness were not mentioned as climate dimensions supporting capturing value. In total 55 times one of the twenty-two dimensions was identified in the answers of the expert panel, an average of 3,24 per expert.

Clear expectations was the most frequently mentioned dimension. This dimension was mentioned six times. The within-group agreement does not exceed the cut-off point (.50), so it cannot be considered as a dimension of a climate for the capturing value of innovation.

#### *Delphi round two*

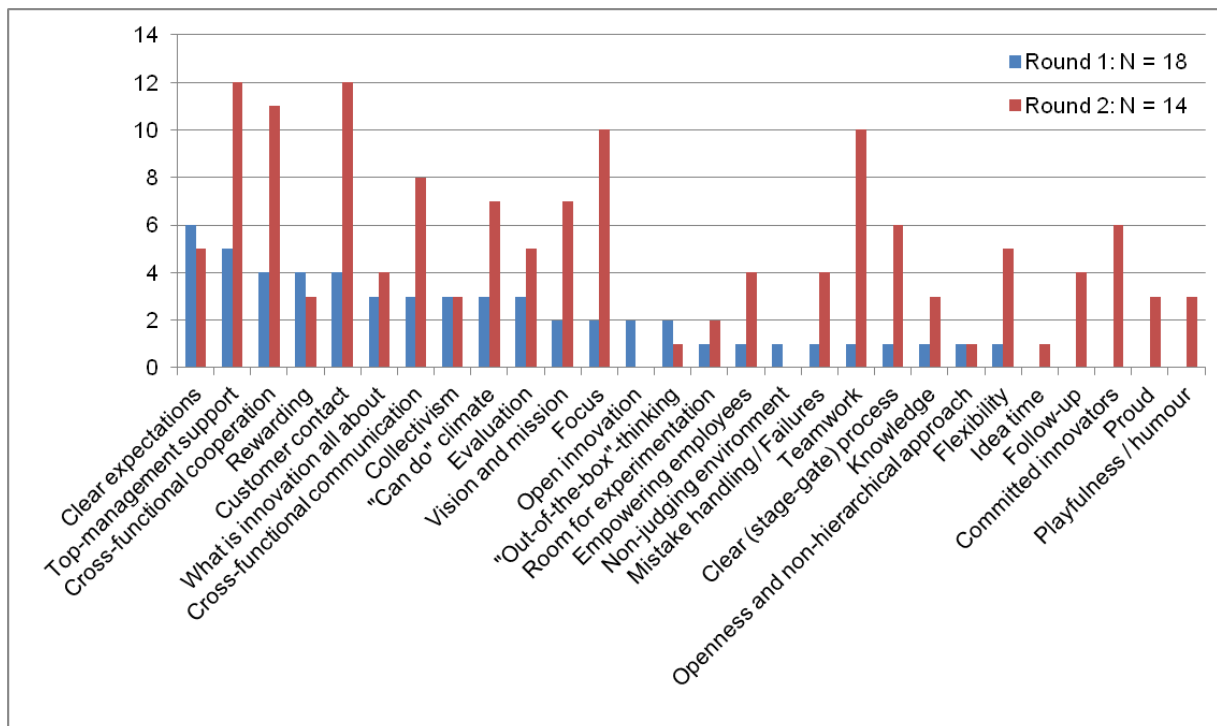
Also for the capturing value phase the within-group agreement in this Delphi round was much higher. Five dimensions were chosen by half or more of the experts, presented in Table 3. Notable is that these five dimensions were also identified for the organizational climate for the development of innovation. The pattern of answers for the development and capturing value phases look similar, more on this will follow in section 4.5. The dimensions of an organizational climate for capturing value will be incorporated in the framework, presented in Table 4 on page 35.

**TABLE 3: DIMENSIONS OF A CLIMATE SUPPORTING CAPTURING VALUE**

Round 1		Round 2	
Dimension	#	Dimension	#
		Top-management support	12
		Customer (market) contact	12
		Cross-functional cooperation	11
		Focus	10
		Teamwork	10

With N = 18 in round 1 and N = 14 in round 2, # = frequency of the mentioned / chosen dimension

The distribution of the answers on the twenty-eight dimensions in the two Delphi rounds is presented in Figure 8. Because of the relatively low average of answers given in Delphi round one for the capturing value phase the differences in answers between the two rounds looks considerable. The difference on the focus and teamwork dimensions are the highest between the two rounds. There are two dimensions which are chosen less in the second round than mentioned in the first round, despite of the difference in the total amount of answers given. The dimensions of clear expectations and rewarding seemed important for the value capturing phase in the first Delphi round, this changed in the second Delphi round.



**FIGURE 8:** SCORE OF THE DIMENSIONS OF A CLIMATE FOR CAPTURING VALUE OF INNOVATION, GRAPH ARRANGED FROM THE MOST MENTIONED DIMENSION IN ROUND 1 TILL THE LEAST MENTIONED.

Based on the presented results an organizational climate for capturing value can be described. This is similar to the organizational climate for the development of innovation, without the dimensions "can do" climate, clear (stage-gate) process and knowledge. When an organizational climate for the capturing value of innovation is present employees perceive the work environment as an environment in which: They know on what projects they should focus, and the focus is on the realization of these projects, with a strict mindset. Top-management shows interest, is committed to and enthusiastic for innovation. Cross-functional cooperation and teamwork are supported and the willingness for cross-functional cooperation and teamwork is high. Employees feel it is important to analyze the market and stay in contact with the market / customers.

#### 4.4 The organizational climate for the innovation process

With the results of the Delphi study a framework of innovation climate dimensions important for the different phases of the innovation process is developed, presented in Table 4.

TABLE 4: FRAMEWORK OF A CLIMATE FOR INNOVATION

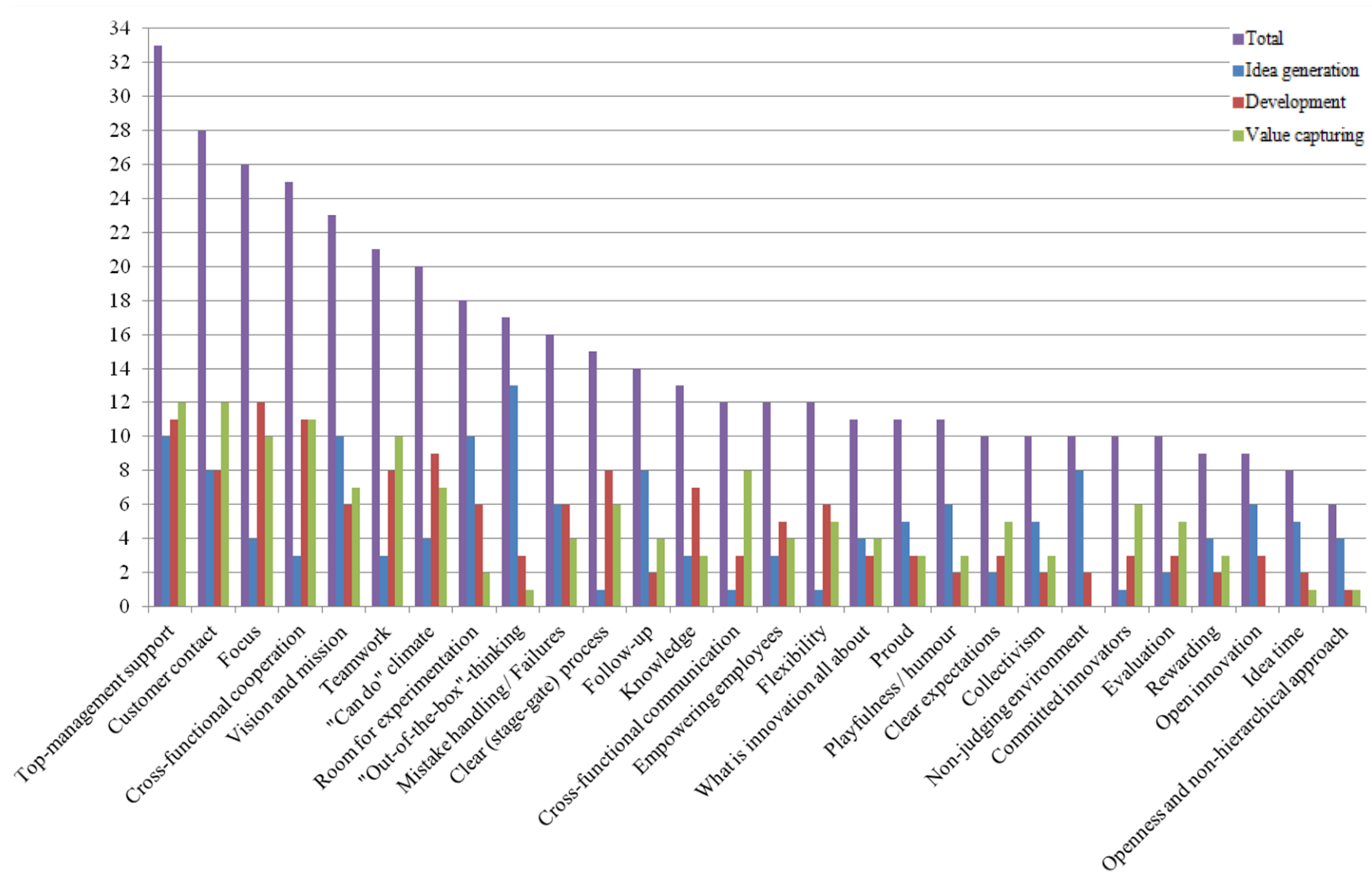
Idea generation	Development	Capturing value
Top-management support Customer (market) contact		
‘Out-of-the-box’ thinking Room for experimentation Non-judging environment Vision and mission Follow-up	Cross-functional cooperation Teamwork Focus	
	“Can do” climate Clear (stage-gate) process Knowledge	

The organizational climate for innovation consists for all phases of the dimensions top-management support and customer (market) contact. The other dimensions are specific for the idea generation or for the development and capturing value phase. The framework supports the idea of the changing nature of innovation throughout the innovation process.

#### 4.5 Comparison of the answers for the innovation phases

In the second Delphi round distinctions emerged between the chosen top ten dimensions for the innovation phases. Based on the level of within-group agreement the organizational climate dimensions have been linked to the innovation phases. We are now interested in the answer on the question if the answers of the respondents given in the second Delphi round differ significantly for the innovation phases.

Figure 9 presents the distribution of the results of Delphi round two. Figure 9 indicates that the pattern of the scores for the development and capturing value phases are most similar to each other. These differences between the phases were calculated. The number of choices for the most important dimensions that differ between the phases of idea generation and capturing value is the largest (116 difference), followed by idea generation and development (102 difference). The number of choices that differ between the phases of development and capturing value is the smallest (52 difference). In Appendix D the table with the results for Delphi round two can be found.



**FIGURE 9:** THE DISTRIBUTION OF THE RESULTS OF DELPHI ROUND 2, WITH N = 14. THE GRAPH PRESENTS THE SELECTED TOP 10 DIMENSIONS OF AN INNOVATIVE WORK CLIMATE FOR THE DIFFERENT INNOVATION PHASES. GRAPH ARRANGED FROM THE DIMENSION MOST CHOSEN FOR THE THREE INNOVATION PHASES TOGETHER TILL THE LESS CHOSEN.

Based on the differences in choices for the most important dimensions we can conclude that the organizational climate for idea generation deviates the most from the organizational climates for the other two phases. The frequencies of the chosen top ten dimensions show that experts selected different dimensions for the phases. Do the dimensions for the innovation phases statistically differ from each other? The relationship between the organizational climate dimensions and the phases is tested with logistic regression.

In table 5 the chi-square test, output of the multinomial logistic regression, is shown. The chi-square test tests the decrease in unexplained variance from the baseline model to the final model. The unexplained difference is decreased from 352,946 to 250,722. This difference of 102,223 is significant ( $p\text{-value} = 0,000 < 0,05$ ), which means that the phases explain a significant amount of the variability in the dimensions. Following the results of the logistic regression we conclude that the dimensions for the innovation phases statistically differ from each other.

**TABLE 5:** OUTPUT OF THE LOGISTIC REGRESSION, MODEL FITTING INFORMATION

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	352,946			
Final	250,722	102,223	54	,000

Besides the logistic regression log-linear analysis is conducted to compare the choices of the experts among the phases. Do the choices of the experts statistically differ for the phases? The contingency table (Table 6) contains the selection of the most important dimensions that fall into each combination of phases. We can see that 133 times a specific dimension was not chosen for all phases by one of the respondents, whereas 38 times a specific dimension was chosen for all phases. Further, the similarities of the chosen dimensions for the first two phases is 59 (38 + 21), for the first and third phase 47 (32 + 15) and for the last two phases 115 (49 + 66).

**TABLE 6:** CONTINGENCY TABLE OF THE DISTRIBUTION OF THE CHOSEN DIMENSIONS BY THE EXPERTS (N = 14)

Dimension not selected or selected for:				
Phase 1	Phase 2	Phase 3	Observed	
Idea generation	Development	Capturing value	Count	%
Not selected	Not selected	Not selected	133	33,9%
		Selected	38	9,7%
	Selected	Not selected	32	8,2%
		Selected	49	12,5%
Selected	Not selected	Not selected	66	16,8%
		Selected	15	3,8%
	Selected	Not selected	21	5,4%
		Selected	38	9,7%
			392	100%

There are no expected counts less than 5 in the contingency table, so the assumptions for log-linear analysis are met. Log-linear analysis tests the interactions between the variables and starts with the highest-order interaction. The results of the log-linear analysis show that the removal of the three-way interaction (phase 1 \* phase 2 \* phase 3) will not significantly affect the fit of the model,  $p\text{-value} = 0,420 > 0,05$ . In other words, the three-way interaction is not a significant predictor of the data. The removal of the two-way interactions has a significant detrimental effect on the model. This means that one or more of the two-way interactions is a significant predictor of the data. The parameter estimates (Table 7) give an answer on the interactions which are a significant predictor. The phase 1 \* phase 2 and phase 1 \* phase 3 interactions are not significant, with  $p\text{-values}$  more than the significance level of 0,05. The phase 2 \* phase 3 interaction is significant,  $p\text{-value} = 0,000 < 0,05$ , indicating that choosing a dimension for the development phase affected choosing a dimension for the capturing value phase.

TABLE 7: OUTPUT LOG-LINEAR ANALYSIS PARAMETER ESTIMATES

Effect		Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Phase 1 * Phase 2 * Phase 3	1	-,049	,061	-,806	,420	-,170	,071
Phase 1 * Phase 2	1	,119	,061	1,944	,052	-,001	,240
Phase 1 * Phase 3	1	-,008	,061	-,126	,900	-,128	,113
Phase 2 * Phase 3	1	,469	,061	7,642	,000	,349	,590
Phase 1	1	,288	,061	4,694	,000	,168	,409
Phase 2	1	,173	,061	2,822	,005	,053	,294
Phase 3	1	,214	,061	3,492	,000	,094	,335

The z-scores give a useful comparison between the effects (Field, 2009). The z-score of the interaction between the development and value capturing phase (7,642) is much higher than the z-scores for the other interactions. The interaction between phase 2 and phase 3 is clearly the most important effect in the model. The choices of dimensions for the organizational climate for development significantly interact with the choices of dimensions for the organizational climate for capturing value. This proves the relationship between the development and capturing value phases.

#### 4.6 Differences between phases on individual dimensions

Besides testing the interactions between the selected dimensions of an organizational climate for the innovation phases in general, we are interested in the interactions between phases on the level of the individual dimensions. This is tested with Cochran's Q. Cochran's Q tests if the importance of a dimension for the innovation phases differs significantly.

#### 4.6.1 Cochran's Q

Cochran's Q tests if the binary answers of the experts on the individual twenty-eight dimensions have the same mean. The results of the twenty-eight Cochran's Q tests are presented in Table 8. There exists a significant difference in the responses among the three innovation phases for ten dimensions (marked in bold in Table 8): 1. focus, 2. cross-functional cooperation, 3. teamwork, 4. room for experimentation, 5. 'out-of-the-box' thinking, 6. mistake handling, 7. cross-functional communication, 8. flexibility, 9. non-judging environment and 10. open innovation. For these ten dimensions the  $p$ -value is lower than the chosen significance level of 0,05. So, we reject  $H_0$  for ten out of the twenty-eight dimensions, for these ten dimensions the distribution in at least two of the phases are significantly different from each other.

**TABLE 8: COCHRAN'S Q TEST RESULTS ON THE DISTRIBUTION OF THE ANSWERS IN DELPHI ROUND 2 FOR THE TWENTY-EIGHT DIMENSIONS OF AN ORGANIZATIONAL CLIMATE FOR INNOVATION**

Results Cochran 's Q tests		
Dimension	Cochran's Q	Asymp. Sig.*
Top-management support	1,500	0,472
Customer contact	2,909	0,234
<b>Focus</b>	<b>9,455</b>	<b>0,009</b>
<b>Cross-functional cooperation</b>	<b>11,636</b>	<b>0,003</b>
Vision and mission	2,889	0,236
<b>Teamwork</b>	<b>9,750</b>	<b>0,008</b>
"Can do" climate	3,455	0,178
<b>Room for experimentation</b>	<b>8,727</b>	<b>0,013</b>
<b>'Out-of-the-box' thinking</b>	<b>19,077</b>	<b>0,000</b>
Mistake handling / Failures	0,727	0,695
<b>Clear (stage-gate) process</b>	<b>9,750</b>	<b>0,008</b>
Follow-up	5,600	0,061
Knowledge	5,333	0,069
<b>Cross-functional communication</b>	<b>8,667</b>	<b>0,013</b>
Empowering employees	1,500	0,472
<b>Flexibility</b>	<b>7,000</b>	<b>0,030</b>
What is innovation all about	0,400	0,819
Proud	1,333	0,513
Playfulness / humour	4,333	0,115
Clear expectations	1,750	0,417
Collectivism	2,000	0,368
<b>Non-judging environment</b>	<b>11,556</b>	<b>0,003</b>
Committed innovators	5,429	0,066
Evaluation	2,800	0,247
Rewarding	1,000	0,607
<b>Open innovation</b>	<b>7,714</b>	<b>0,021</b>
Idea time	3,714	0,156
Openness and non-hierarchical approach	3,600	0,165

\*With N = 14, significance level of 0,05

#### 4.6.2 McNemar

For the dimensions for which the Cochran's Q test result was statistically significant, meaning that the importance of the dimension differs significantly for the phases, pairwise comparisons are made with McNemar. McNemar tests if the importance of a dimension differs significantly between a) the idea generation phase and the development phase, b) the idea generation phase and the capturing value phase, and c) the development phase and the capturing value phase. The results of the McNemar tests for the ten dimensions are presented in Table 9.

**TABLE 9: MCNEMAR TEST RESULTS ON THE DISTRIBUTION OF THE ANSWERS IN DELPHI ROUND 2 FOR TEN DIMENSIONS OF AN ORGANIZATIONAL CLIMATE FOR INNOVATION**

	Idea generation - Development	Idea generation - Capturing value	Development - Capturing value
Dimension	Sig. (2-tailed)	Sig. (2-tailed)	Sig. (2-tailed)
Focus	<b>0,021</b>	0,070	0,625
Cross-functional cooperation	<b>0,008</b>	<b>0,021</b>	1,000
Teamwork	0,063	<b>0,016</b>	0,625
Room for experimentation	0,219	<b>0,021</b>	0,219
'Out-of-the-box' thinking	<b>0,002</b>	<b>0,000</b>	0,625
Clear (stage-gate) process	<b>0,016</b>	0,063	0,625
Cross-functional communication	0,500	<b>0,016</b>	0,180
Flexibility	0,063	0,125	1,000
Non-judging environment	0,070	*	**
Open innovation	0,375	*	**

\* No statistics computed constant

\*\* Computed only for a PxP table, where P must be greater than 1

\*With N = 14, significance level of 0,05

For seven dimensions (focus, cross-functional cooperation, teamwork, room for experimentation, 'out-of-the-box' thinking, clear (stage-gate) process and cross-functional communication) the differences are statistically significant ( $p$ -value < 0,05). A statistically significant result for a dimension means that the importance of the dimension for the organizational climate for innovation differs across the specific innovation phases according to the top ten selection of the experts.

All the significant results are between the idea generation phase and one of the other two phases. The importance of the dimensions does not differ for the development and capturing value phases. This is in line with the results of the log-linear analysis, where the interaction between the development and capturing value phases was significant.

The results of the conducted tests all support the expectation that the dimensions for the innovation phases differ. Based on the log-linear analysis and the McNemar test results we can conclude that there is a climate for idea generation and a climate for the implementation of innovation. Whereby the implementation of innovation consists of the development and capturing value phases. The dimensions that differ between the idea generation phase and the implementation phase are focus, cross-functional cooperation, teamwork, room for experimentation, 'out-of-the-box' thinking, clear (stage-gate) process and cross-functional communication.



## 5 CONCLUSION AND DISCUSSION

### 5.1 Recapitulation

Many scholars have distinguished phases within the innovation process (cf. Utterback, 1971; Van de Ven et al., 1999; Tidd & Bessant; 2009). However, when innovation success factors are described, they are mostly associated with innovation in general. Despite the large differences between the phases, the possibly changing nature of innovation success factors for the individual phases is a rather under-investigated area. As Adams et al. (2006) observed in their review the absence of measuring the shift between phases is a significant research gap. The organizational climate for innovation is an important success factor for which this shift between phases is not investigated before. Therefore the research focused on exploring the climate for innovation for the individual innovation phases, with the goal to:

*Develop a framework of innovation climate dimensions important for the different phases of the innovation process, taking into account the structural shift between phases.*

In the theoretical framework the concepts of the innovation process and organizational climate for innovation were introduced. Based on a literature review the innovation process was divided into three phases: 1. idea generation, 2. development and 3. capturing value. For these three phases innovation climate dimensions were collected in the first round of the Delphi study. A list of twenty-eight elements was composed after the input from eighteen innovation management experts. The list with innovation climate dimensions was then presented to the experts in the second Delphi round. Fourteen experts completed the second round in which the experts had to choose the ten most important dimensions for the individual innovation phases. With the results of the second round a framework of innovation climate dimensions important for the different phases of the innovation process was developed (Table 10). In the framework the dimensions for the innovation phases differ.

**TABLE 10:** DIMENSIONS OF A CLIMATE FOR THE DIFFERENT INNOVATION PHASES COMPARED WITH THE COCHRAN'S Q TEST RESULTS

Idea generation	Development	Capturing value
<i>Top-management support*</i> <i>Customer (market) contact</i>		
<i>'Out-of-the-box' thinking</i> <i>Room for experimentation</i> <i>Non-judging environment</i> Vision and mission Follow-up	<i>Cross-functional cooperation</i> <i>Teamwork</i> <i>Focus</i>	
	"Can do" climate Clear (stage-gate) process Knowledge	

*\*The dimensions marked in italic are supported by the results of Cochran's Q and McNemar*

The dimensions in the framework can all be linked to the four key climate dimensions of Schneider et al. (1996). Non-judging environment, cross-functional cooperation and teamwork are most related to the nature of interpersonal relationships. How are employees working together? Top-management support, vision and mission, focus and clear (stage-gate) process are most related to the hierarchy. How is the work organized? Customer (market) contact, 'out-of-the-box' thinking, room for experimentation and knowledge are most related to the nature of the work. How do employees perceive their day-to-day work activities? The follow-up of ideas and "can do" climate are most related to the focus of support and rewards. Is something done with the ideas and are employees getting the resources to do something with the ideas?

Besides developing a framework with innovation climate dimensions for the innovation phases the research tested to what extent the three innovation phases differ in the identified innovation climate dimensions. Logistic regression resulted in a statistically significant difference between the dimensions among the phases. The results of the log-linear analysis proved the relationship between the choices of the experts for the development and capturing value phases. The results of the Cochran's Q and McNemar tests showed for which individual dimensions the difference between phases is statistically significant. The comparison of the dimensions in the framework (Table 10) with the results of the Cochran's Q test reveal that for six dimensions that differ between phases the difference is statistically significant. The McNemar tests showed that the differences are always between the idea generation phase and the other phases. So, the structural shift takes place between the idea generation and the development and capturing value phases.

The framework is for the dimensions of 'out-of-the-box' thinking, room for experimentation, non-judging environment, cross-functional cooperation, teamwork and focus supported by statistics. The non-significant results on the Cochran's Q tests for the dimensions of top-management support and customer contact also support the framework, for these dimensions the importance for the organizational climate for innovation is the same across the innovation phases. Based on the research it can be concluded that there is an organizational climate for idea generation and an organizational climate for the implementation of innovation.

## **5.2 Theoretical implications of the research**

The main theoretical implication of this study is the proven relevance of bringing the innovation climate dimensions in relation with individual innovation phases. The study added new dimensions to the organizational climate for innovation, caused by the interest of the study in the whole innovation process. When comparing the dimensions in the framework with the dimensions in the existing literature the dimensions considered as important for idea generation are more in line with the existing literature than the dimensions considered as important for development and capturing value. This is what we expected, because most literature focuses on the creativity side of innovation.

In literature about generating ideas and adopting innovation, freedom is mentioned by scholars (Amabile et al., 1998; Ekvall, 1996), 'out-of-the-box' thinking and room for experimentation relate to

this. A dimension as 'focus', that seems to be the opposite of freedom, is not in the climate for innovation literature yet. This change from freedom to focus underscores the structural shift between phases. The innovation process starts with divergence, for which employees have to perceive freedom in their work. After generating ideas the innovation process changes in convergence, for which employees have to perceive a strict mindset on which projects to focus. Because of the process view on innovation, the research contributes to a better understanding of what a climate for innovation means throughout the innovation process.

Besides the implications for future studies on the organizational climate for innovation and the innovation process there are also theoretical implications on the use of the Delphi method for management studies. The study is a proof for the suitability of the Delphi study for explorative studies with experts from practice. Where the first Delphi round did not show clear differences between the innovation phases, the second Delphi round did. It is likely that because of the method differences between phases were revealed. When the study only encompassed expert interviews the experts were not forced to make choices and re-assess their opinion. Based on the study results it is recommended to use the Delphi method more often when exploring topics in the field of (innovation) management.

### **5.3 Practical implications of the research**

One of the practical implications is the attention that should be paid to the innovation phases when creating the organizational climate for innovation. When a project team is working on the generation and selection of new ideas, management should focus on specific dimensions of the innovation climate, including 'out-of-the-box' thinking and creating a non-judging environment. When the project team moves forward in the innovation process management attention should also change to another set of dimensions of the innovation climate, including teamwork and focus. The study results show the list of dimensions relevant for the different phases of the innovation process. Practitioners could apply the presented framework with the list of dimensions to their individual situation.

Management can influence the organizational climate by the organizational structure and practices. Practices are perceived by organizational members as rewards or punishments for specific behaviors and these practices result in the organizational climate (Ostroff et al., 2003; Schein, 2011). So, the organization should adapt, where possible, the organizational structure and practices to the idea generation of innovation and the implementation of innovation. Top-management has a crucial role in this creation of the organizational climate of innovation. Whereby the top-management role is more than filling in the organizational structure and practices. This study confirms the, by different researchers in different fields proven, important role of top-management support (Daft, 2008). Top-management support, was the most chosen dimension in this study. Managers should never forget that if they strive for innovation, they are the ones to symbolize to all employees that innovation is important for the organization.

#### 5.4 Limitations and need for further research

Although the research has reached its goal, there are a number of caveats in the study.

First, the external validity is threatened by the volunteer bias. Volunteers from a specified sample may differ from those of non-volunteers (Shadish, Cook & Campbell, 2002). The experts who have chosen to participate in the study were likely more interested in the subject of an organizational climate for innovation. This volunteer bias happens often in research. Because of the time consumption of the Delphi method, this volunteer bias is here more profound than in other research methods. Possible reasons for participation which can be thought of are; the topic is top priority in the organization or the expert struggles with the topic. The particular interest in the subject enhances the likelihood that the opinion of the participants differs from the total population, what threatens the external validity.

Related to the first limitation is the threat to the external validity by the chosen sample of experts. Based on the operationalization of expert for this study respondents were selected, whereby most experts came from the network of The Bridge. The Bridge focuses on a specific type of sectors and therefore not all sectors are equally represented. Within the sample there are more experts from utilities and companies operating in the B2B-market than there would be in the 'ideal' sample. This threatens the external validity. Although, we do not expect that the results will be different when having, for example, more experts from the B2C-market in the sample. Because the innovation phases are the same and the organizational climate dimensions look applicable to all markets.

Third, the limitation of the "subjectivity" in interpreting the data acquired from respondents and transforming these coded fragments into conclusions (Thomas & James, 2006). The grouping by coding of the answers given in the first Delphi round, was needed to make the data comparable. Unfortunately, this fragmenting of respondent's perceptions by coding, largely destroys the individual narrative of the respondents and endangers the right interpretation of the responses. Future research should incorporate a validation of the coding by the experts between the Delphi rounds. This is also what Schmidt (1997) recommends, "*without this step, there is no basis to claim that a valid, consolidated list has been produced*" (p. 769). For this study, it was a conscious choice to omit this step, in order to reduce the likelihood of participants dropping out of the study. With omitting this step the time consumption of participation was kept as low as possible.

To partly offset the limitation created by the missing step in the Delphi method more than one person has looked at the answers of the respondents whereby the answer to be coded required the subjective interpretation of the coder. The data will be more reliable and therefore more valid, when multiple persons agree on the coding of the data (Campbell, Quincy, Osserman & Pedersen, 2013). Besides the incorporation of the validation of the coding by the expert panel, we recommend to work structurally with more than one coder.

The fourth limitation is also related to how the Delphi method is executed; the missing of a third round. The ranking-type Delphi survey approach of Schmidt (1997) consists of three Delphi rounds, in the

third round the respondents rank the most important dimensions. Some respondents indicated after Delphi round two that it would be impossible to rank the dimensions, because the presence of several dimensions together makes the climate for an innovation phase. Based on these signals the choice was made to omit the ranking. However, it is unclear if all respondents had the same opinion. The study results would be stronger when the third round was also conducted. Then the result could have been a valid 'ranking is impossible'. When conducting a Delphi study by using the method of Schmidt (1997) the whole process needs to be fulfilled in future studies, also when the topic seems to be less suitable for the last round.

Fifth, the results of the Delphi study only contain the initial stages of theory development. Now the dimensions of interest for the individual innovation phases are identified, the framework that is developed needs to be tested. These study results prove that it is relevant to split up the innovation process in phases when analyzing innovation success factors. More research is needed on this matter. Empirical studies can develop the framework further. In this study only the opinion of experts was taken into account, future studies should incorporate the view of all employees. Everyone who perceives the organizational climate for innovation.

It might be also interesting to look more specific to the dimensions within the framework. How does the presence of a dimension influence the result of the innovation process? In this regard, a possible research direction is combining the framework with the two-factor theory of Herzberg, also known as Herzberg's motivation-hygiene theory. This theory states that two entirely separate dimensions contribute to an employee's behavior at work (Daft, 2008). On the one hand there are hygiene factors, which can cause job dissatisfaction, on the other hand there are motivators, which can cause job satisfaction (Herzberg, 2003). Future studies can investigate if the dimensions of the framework are hygiene factors or motivators. It will be hygiene factors when they are necessary within the organizational climate before employees will strive for innovation. It will be motivators when it leads to the motivation of employees to strive for innovation.

## **5.5 Conclusion**

Twenty-five years ago Holbek already argued that if an innovating organization moves from the initiation to the implementation stages of innovation, contrasting structures and climates must be adopted (Holbek, 1988, according to Adams et al., 2006: p. 34). Based on this idea, this research was started to develop a framework of the organizational climate for the whole innovation process. The study results show that the structural shift between phases takes place between the idea generation phase and the development and capturing value phase. The results re-emphasize the idea of the changing nature of innovation throughout the innovation process. For both academics and practitioners it is important to keep this changing nature in mind when conducting research to or being involved in innovation. The developed framework needs to be further developed by scholars. For managers the framework provides guidelines with which they can work.



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# APPENDIX A: LITERATURE REVIEW OF THE INNOVATION PROCESS PHASES

Author	Phases
Utterback (1971)	<ol style="list-style-type: none"> <li>1. Idea generation</li> <li>2. Problem solving</li> <li>3. Implementation, possibly followed by diffusion</li> </ol>
Crawford (1983) & Johnes & Snelson (1988)	<ol style="list-style-type: none"> <li>1. New product planning</li> <li>2. Idea generation</li> <li>3. Screening</li> <li>4. Technological development and marketing appraisal</li> <li>5. Launch</li> </ol>
Wheelwright & Clark (1992)	<ol style="list-style-type: none"> <li>1. Creating development projects</li> <li>2. Convergence to concept/detailed design</li> <li>3. Commitment to market</li> </ol>
Waldman & Bass (1991)	<ol style="list-style-type: none"> <li>1. Idea generation</li> <li>2. Idea realization</li> <li>3. Diffusion</li> </ol>
Scott & Bruce (1994)	<ol style="list-style-type: none"> <li>1. Promoting ideas</li> <li>2. Securing funds to implement ideas</li> <li>3. Developing schedules for implementation</li> </ol>
Van de Ven et al. (1999)	<ol style="list-style-type: none"> <li>1. Initiation</li> <li>2. Development</li> <li>3. Implementation</li> <li>4. Termination</li> </ol>
Cormican and O'Sullivan (2004)	<ol style="list-style-type: none"> <li>1. Search</li> <li>2. Select</li> <li>3. Implement</li> </ol>
Maxwell (2009)	<ol style="list-style-type: none"> <li>1. Idea generation and screening phase</li> <li>2. Speed to marketing phase</li> </ol>
Tidd & Bessant (2009)	<ol style="list-style-type: none"> <li>1. Search</li> <li>2. Select</li> <li>3. Implement</li> <li>4. Capture</li> </ol>

# APPENDIX B: LIST OF ELEMENTS DELPHI ROUND TWO

## Elements of the organizational climate for innovation

1. **Vision and mission:** Employees share the vision and mission of the organization, and the ambition to reach certain goals (related to innovation)
2. **What is innovation all about:** Employees share the understanding about what innovation is for the organization
3. **Focus:** Employees know on what projects they should focus, and the focus is on the realization of these projects; strict mindset
4. **Collectivism:** Employees perceive innovation as important for the survival of the company and look at opportunities for the company as a whole
5. **Proud:** Employees are proud of the organization as being an innovator
6. **Playfulness/ humour:** Employees perceive the atmosphere as relaxed with jokes and laughter, where they are able to have fun
7. **'Out-of-the-box' thinking:** Employees perceive out-of-the-box thinking as something which is encouraged and accepted
8. **Room for experimentation:** Employees have the freedom to explore freely and undertake other activities than their 'normal' activities
9. **Non-judging environment:** Employees have the feeling that they can come up with new ideas/ developments without being judged, group norms focus on 'what is good about it?' instead of 'why is it impossible?'
10. **Mistake handling / Failures:** Employees feel it is allowed to make mistakes and that the organization recognizes that "failure" can (and should sometimes) happen
11. **Teamwork:** Employees perceive teamwork as something which is supported and the willingness to work in teams is high
12. **Cross-functional cooperation:** Employees perceive cross-functional cooperation as something which is supported and the willingness for cross-functional cooperation is high
13. **Cross-functional communication:** Employees know which new projects are initiated; knowledge about innovation is communicated throughout the whole organization
14. **Open innovation:** Employees feel free to look at and make use of external ideas and other people's business; enabling of open innovation
15. **Customer (market) contact:** Employees have the feeling that they should analyze the market and stay in contact with the market / customers; knowing what value means for the customer
16. **Knowledge:** Employees know a lot about new technologies and developments; product/service related knowledge is available and accessible and knowledge is shared

17. **Openness and non-hierarchical approach:** Employees are open to work with people from different backgrounds (e.g. different cultural backgrounds and from different levels in the hierarchy) and everyone is treated as equal
18. **Idea time:** Employees perceive spending time on ideas/ developments as something which is supported and the willingness to spend time on idea generation is high
19. **Follow-up:** Employees perceive that something is done with their ideas; they can see their work is actively followed-up
20. **Committed innovators:** Employees that come up with an idea are also concerned with the implementation of the idea
21. **“Can do” climate:** Employees are motivated to follow their ideas and make them happen; they also feel that they can make them happen (this relates to having the resources).
22. **Rewarding:** Employees have the feeling that new promising ideas are rewarded; work on innovation, in general, is rewarded
23. **Top-management commitment:** Employees feel top-management attention / concern / interest / commitment / enthusiasm for innovation
24. **Flexibility:** Employees perceive flexibility in the process as important and can act in a flexible manner (e.g. different for different types of products/services)
25. **Clear (stage-gate) process:** Employees see the (development) process as a clear process with gates and gate criteria
26. **Clear expectations:** Employees know what the expected outcomes are and KPI's are defined and communicated
27. **Evaluation:** Employees feel evaluation is encouraged and know what the results of innovation are and the effects of innovation are shown
28. **Empowering employees:** Employees feel they are able to make own decisions about their jobs related to innovation/ entrepreneurship; they can decide in an autonomous way

## APPENDIX C: SCORING SHEET DELPHI ROUND TWO

### Scoring sheet – Elements of an innovative work climate

In step 7 you have read the list of 28 elements of an innovative work climate. Step 8 is to select for each of the phases within the innovation process the ten most important elements for excellent innovation results in the specific phase:

1. What are the ten most important elements for the idea generation phase?
2. What are the ten most important elements for the development phase?
3. What are the ten most important elements for the capturing value phase?

You can choose by clicking on the boxes, the numbers correspond with the numbers in the list of 28 elements.

**Important!** You have to pick ten elements for each phase (ten for idea generation, ten for development and ten for capturing value). So, the question is not to choose the ten most important for innovation in general.

	Idea generation	Development	Capturing value
1 Vision and mission	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 What is innovation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 Focus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Collectivism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 Proud	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Playfulness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 'Out-of-the-box'	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 Experimentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9 Non-judging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10 Mistake handling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11 Teamwork	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12 Cross-functional1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13 Cross-functional2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14 Open innovation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15 Customer contact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16 Knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17 Non-hierarchical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18 Idea time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19 Follow-up	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20 Committed inn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21 "Can do" climate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22 Rewarding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23 Top-management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24 Flexibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25 Clear process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26 Clear expectations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27 Evaluation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28 Empowering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## APPENDIX D: RESULTS OF DELPHI ROUND TWO

Element	Scores for the phases			Difference between the scores		
	Phase 1	Phase 2	Phase 3	Phase 1 - Phase 2	Phase 1 - Phase 3	Phase 2 - Phase 3
1 Vision and mission	10	6	7	-4	-3	1
2 What is innovation all about	4	3	4	-1	0	1
3 Focus	4	12	10	8	6	-2
4 Collectivism	5	2	3	-3	-2	1
5 Proud	5	3	3	-2	-2	0
6 Playfulness/ Humour	6	2	3	-4	-3	1
7 'Out-of-the-box' thinking	13	3	1	-10	-12	-2
8 Room for experimentation	10	6	2	-4	-8	-4
9 Non-judging environment	8	2	0	-6	-8	-2
10 Mistake handling/ Failures	6	6	4	0	-2	-2
11 Teamwork	3	8	10	5	7	2
12 Cross-functional cooperation	3	11	11	8	8	0
13 Cross-functional communication	1	3	8	2	7	5
14 Open innovation	6	3	0	-3	-6	-3
15 Customer (market) contact	8	8	12	0	4	4
16 Knowledge	3	7	3	4	0	-4
17 Openness and non-hierarchical approach	4	1	1	-3	-3	0
18 Idea time	5	2	1	-3	-4	-1
19 Follow-up	8	2	4	-6	-4	2
20 Committed innovators	1	3	6	2	5	3
21 "Can do" climate	4	9	7	5	3	-2
22 Rewarding	4	2	3	-2	-1	1
23 Top-management commitment	10	11	12	1	2	1
24 Flexibility	1	6	5	5	4	-1
25 Clear (stage-gate) process	1	8	6	7	5	-2
26 Clear expectations	2	3	5	1	3	2
27 Evaluation	2	3	5	1	3	2
28 Empowering employees	3	5	4	2	1	-1
Total	140	140	140	102	116	52



