MASTER

Validation of the situational outlook questionnaire
a longitudinal study of the organizational climate for creativity of teams during he NPD project

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This report describes the validation of the Situational Outlook Questionnaire (SOQ) for measuring the organizational climate for creativity in the context of New Product Development (NPD) at Royal Philips Electronics. An SOQ-based longitudinal study of the organizational climate in NPD is described, which investigates the following questions: 1) Is an NPD team appropriate as a level of analysis? 2) Do the scores of the SOQ decrease during the NPD? Such a decrease could indicate that certain SOQ scores are more suited at the different phases of the NPD. Furthermore, 3) construct validity has been examined by comparing the results of the SOQ to the results of semi-structured interviews.

Major Findings: 1) Teams can be used as an appropriate research unit for NPD projects which have the right team size and have task interdependency. However, the measurement can be influenced, because all considered NPD projects have partial inclusion. 2) No indication has been found, that the scores of the SOQ decrease during the NPD. However, still it is suggested that interpretation of the scores of the SOQ depends on the phase of the NPD. 3) Construct validity could be determined for seven of the nine dimensions related to the measure of general NPD activities. However, measuring the dimensions Idea Time, and Risk Taking seems inappropriate at the beginning of the considered NPD projects. Suggestions for future research with the use of the SOQ in the context of NPD are provided. Furthermore, recommendations how the use of the SOQ may contribute to understanding of the organization are presented also.

Preface

In may 2006, I started my final graduation project at Philips Industry Consulting in Eindhoven. On behalf of the Technical University Eindhoven I was asked to conduct a longitudinal study of the organizational climate in teams during the development of new products. It was a challenging assignment because just like the development of a new product, I had to do development work as well, which in this case was the longitudinal research design. In a way, therefore I had to experience the same as the product developers in the teams I studied. Developing is coping with uncertainty about possible problems and the need for creativity to solve theses problems in turn.

The ultimate bottom line of this study is to contribute to Philips to be even more innovative and just make even more beautiful products. The purpose is like in a song of Bruce Springsteen, 'can't start a fire without a spark', it is to set a fire, a light (something Philips has a rich history in). But in contrast to the song, the people of Philips have enough sparks but the started fire could be enhanced more. Great ideas, the sparks, have to be transformed into successful innovations. This study should contribute to Philips, to keep distinguishing itself in a world of increasing competition.

Gladly, I would like to make use of the opportunity to thank some people without who's support this report never could have been what it is now. I would like to thank Elke den Ouden for reviewing my work and giving me the opportunity to work with the Philips Industry Consulting group which opened the doors to the many NPD projects within the Philips organization. I would like to thank Christoph Dobrusskin for helping me structure my report (the pyramid). Furthermore I would like to thank Simon Minderhoud, Jose Loeffen, Lianne Simonse and Hans Raadsen, with whom I engaged in many discussions on creativity and the climate and NPD projects.

Thanks to Tessa Beurskens, Simon Tosserams, Marijn Emans, and Roel Frissen, for their support to my graduation project.

Wendelien van Eerde was the greatest support in reviewing my writings. I believe she really got the best out of me.

Furthermore I would like to thank my family for their constant support during my study and for believing in me. Thanks!

Eindhoven, November 2006

Remco van den Beucken

Summary

This study was conducted at Royal Philips Electronics in the Netherlands with the support of the Industry Consulting group. The objective of this study was to validate the use of the Situational Outlook Questionnaire (SOQ) in the context of New Product Development (NPD). The SOQ is a measure of the organizational climate for creativity. The results are interesting for 1) Philips to improve the organizational climate of NPD teams, and 2) the literature of the organizational climate for creativity, because research in the NPD context is rare.

The organizational climate can be defined as; 'recurring patterns of behavior, attitudes, and feelings that characterize life in the organization' (Isaksen, Lauer, and Ekvall, 2001, 172). Creativity may be defined as 'Production of novel and useful ideas in any domain' (Amabile, 1996, p 55). Measuring the organizational climate for creativity is interesting because, 1) it increases understanding of the organization. 2), the organizational climate can increase the motivation and the well-being of organization members.

In order to validate the use of the SOQ in the context of NPD, in NPD teams, three aspects were considered. 1) It was questioned if NPD teams are an appropriate research unit. 2) A norm has to be established that may be considered as optimal scores of the SOQ in the context of NPD at different phases. 3) Construct validity of the SOQ has been investigated by measuring the organizational climate with multiple methods.

Five research questions have been examined related to the three aspects of validation, presented above; *Teams*: In order to determine if really teams have been measured, the following research questions have been proposed;

Q1: What is the team size?

Q2: Is there task interdependence in the teams?

In order to determine if the team can be influenced by other members of the organization, follows;

Q3: What is the degree of inclusion of team members during the NPD process?

Development of a norm: Since during the NPD the focus may shift from 'doing things different' at the beginning, towards 'doing what we do better' at the end, the organizational climate for creativity may change as well. In order to study this difference, the results of this study have been compared at two points in time, and with the results of Huisman (2006), a former study of the organizational climate for creativity at Philips.

Q4: Do the scores of the SOQ decrease, during the NPD project?

Multiple methods: In order to examine construct validity, the results of the SOQ have been compared with the results of semi-structured interviews.

Q5: Are the results of the SOQ related to the results of the interviews?

Major Findings: 1) Teams can be used as an appropriate research unit for NPD projects which have the right team size and have task interdependency. However, the measurement can be influenced, because all considered NPD projects have partial inclusion. 2) No indication has been found, that the scores of the SOQ decrease during the NPD. However, still it is suggested that interpretation of the scores of the SOQ depends on the phase of the NPD. 3) Construct validity could be determined for seven of the nine dimensions related to the measure of general NPD activities. However, measuring the dimensions *Idea Time*, and *Risk Taking* seems inappropriate at the beginning of the considered NPD projects.

Suggestions for future research have been made with regard to three aspects. *General understanding of the SOQ:* Future research is necessary to investigate the relation between the scores of the SOQ, and the NPD activities within the NPD project. This may also contribute to determining construct validity. *Teams:* Future research is necessary to determine to what extent NPD team members are influenced during contact outside the projects. *Development of a norm:* more research is necessary to determine whether the scores of the SOQ decrease during the NPD. Especially, scores of the SOQ of considered NPD teams further in the NPD project have to be included

To conclude, the SOQ can contribute to understanding of the organization. Understanding the organizational climate may contribute to developing and implementation of organizational improvement initiatives.

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1 Introduction

1.1. The organizational climate and the relation with the organization

Organizations are facing increased competition, and technological developments are taking place in an increasing pace (Mathisen & Einarsen, 2004). Therefore, continuous improvement and adaptation of the organization is required to remain competitive, and research on New Product Development (NPD) is necessary. The NPD process starts with generating an idea of a new product and ends with the manufacturing and sales of the product. According to Cooper, Edgett & Kleinschmidt (2004) the research on NPD can be summarized by four main aspects; strategy, focus on people, process, and resource. Part of the focus on people is the right climate for creativity. Cooper and Kleinschmidt (1996) and Montoya-Weiss and Calantone (1994) found a 'considerably high' correlation between innovative climate in relation to profitability.

The organizational climate for creativity is considered in order to achieve innovations.
Organizational climate can be defined as;

> 'recurring patterns of behavior, attitudes, and feelings that characterize life in the organization' (Isaksen, Lauer, and Ekvall, 2001, 172).

When individual perceptions of the organizatioin are aggregated, a sense of shared meaning can be observed which is referred to as organizational climate (Isaksen & Lauer, 2002). Thus, climate may be conceptualized as employees' shared perceptions of organizational events, practices, and procedures (Patterson, West, Shackleton, Dawson, Lawthon, Maitlis, Robinson, & Wallace, 2005).
Climate is distinct from culture in that the climate is more directly observable within the organization. Observe that, culture refers to the deeper and more enduring values, norms, and beliefs within the organization (Isaksen et al., 2001; Schneider, Brief and Guzzo, 1996). (For a complete overview of differences between climate and culture, see Appendix I.)
Creativity may be defined as

> 'Production of novel and useful ideas in any domain' (Amabile, 1996, p 55).

Individual creativity is comprised of three components which are expertise, creative thinking skills and motivation (Amabile, 1998). 'Creativity begins with problem recognition which leads to the generation of novel ideas, products, services, or processes by an individual or group of individuals' (Amabile, 1996, p. 1155). After a creative idea has been generated, the idea should be implemented within the larger organization. As such creativity can be regarded as the seed of all innovation (Amabile, 1996). It is a necessary but not sufficient condition for innovation (Amabile, 1996).
Innovation my be defined as

> 'The successful implementation of creative ideas within the organization' (Amabile, 1996, p 1155).

Although, creativity is prior to innovation, creativity and innovation are closely intertwined. The distinction between the two activities is not always easy to make. A creative idea will have to be further developed to some extent. A creative idea is only ready to be presented, if it is to a certain degree clear how the idea should be implemented (Levitt, 2002). This further development is related to implementation and as a result it may be hard to identify what is the development of a creative idea, and what is the implementation of an idea.

How employees perceive the organizational environment can be regarded as the organizational climate (Brown & Leigh, 1996). According to Tesluk, Farr, and Klein (1997) the organizational environment is related to structures and practices, such as:

- human resource practices,
- work structures,
- organizational policies,
- physical work arrangements.

The definition of the organizational climate suggests that the organizational climate is related to the structures and patterns of the organization. Therefore, understanding the organizational climate may contribute to the success of NPD in two ways. First, measuring the organizational climate can increase understanding of the influence of the structures and practices. 'The organizational climate provides a basis for interpretation, identifies important goals and the means to achieve them, and creates a force for action' (Tesluk et al., 1997, p.33). Understanding the organizational climate may contribute to developing and implementation of organizational improvement initiatives (Isaksen & Lauer, 1999, 2001). Second, the organizational climate can increase the motivation and the well being of organization members (Brown & Leigh, 1996; Isaksen & Lauer, 2002; Neal, West & Patterson 2004).

1.2 Does the need for creativity change during the NPD project?

In order to understand the organizational climate for creativity and change, one first has to understand the need for creativity. Organizations need to be innovative in order to remain competitive. Companies with a more creative organizational climate should develop more innovative ideas than companies with a stagnated organizational climate (Amabile et al., 1996; Isaksen et al., 2001, 2002). However it can be questioned if creativity is needed in every part in the organization and even within every phase of the NPD project. At the beginning of an NPD project, a lot of creativity is needed to decide what kind of product should be developed. However, at the end of the NPD project, a coordinated production process has to be delivered. According to Isaksen and Tidd (2006), developing new products requires two fundamentally different but complementary kinds of focus. The first is aimed at exploration of new opportunities and the second is aimed at creating routines and 'good practice'. According to Amabile (1998), creativity can compete with other business imperatives such as quality. However, according to Amabile (1998), it should be possible within organizations to focus on quality as well as on creativity.
Since it is not clear if the need for creativity changes, it is necessary to study the organizational climate for creativity and change during the NPD project. If the need for creativity decreases, than also the organizational climate for creativity should change.

1.3 Research at Philips[1]

This master thesis has been conducted at Royal Philips Electronics N.V. at Applied Technology at the department Industry Consulting. Philips is one of the largest global electronics company with sales in 2005 of EUR 30,395 million, and with a long history starting in 1891. As a multinational it has manufacturing sites in 32 countries, sales outlets in 150 countries and it has a multinational workforce of 158,000 employees (July 2006). The production is divided into five product divisions which are: Consumer Electronics, Lighting, Domestic Appliances and Personal Care, Semiconductors[2] and Medical Systems.

[1] Sources: www.philips.com/ company info
www.apptech.philips.com / company profile / company presentation

The broad range of Philips products can mainly be divided into the areas of Healthcare, Lifestyle, and Technology. Although the products might differ, Philips tries to create a sense of coherence by a focus on their brand promises of 'sense & simplicity'. Philips tries to develop new products and solutions that are: 'designed around you, easy to experience, advanced'

Philips Applied Technology (AppTech) is part of R&D. AppTech has a workforce of 1200 people and generates about 300 new patent fillings every year. Part of AppTech is Industry Consulting (IC). This consultancy group gives advice within Philips but also to external customers, mainly in the area of industrial processes. A group of 60 people is working at the IC department. It has been organized in three groups, which are: Governance & Control Solutions, Operational Excellence Solutions, and Innovation & Product Development Solutions. The assignment for this study came from the latter group in particular from the group of people who support idea generation and selection processes for new technologies, products, and product functions.

1.4 Measurement of the organizational climate for creativity in the NPD context

In order to study the organizational climate during the NPD a measure of the organizational climate is necessary. Therefore, the Situational Outlook Questionnaire (SOQ) can be used as a diagnostic tool which can contribute to the understanding of the organization to support creativity and change (Isaksen & Lauer, 2001).

Several studies (Isaksen, Lauer, Ekvall, & Britz, 2001; Isaksen and Lauer, 2001) showed that companies with higher scores where also more innovative. Thus the measurement seems to be valid. All studies that have validated the SOQ instrument, and have been described in a journal, have been reviewed by Mathisen and Einarsen (2004). According to these authors, a previous version of the SOQ, a 10 factor model, has an acceptable predictive validity with regard to being innovative. (Ultimately, a 9 factor model has been chosen, because the analysis of variance explained more variance (Mathisen & Einarsen, 2004).) Therefore, it assumed that the current, nine factor model, will be valid also.

This is the second study of the organizational climate for creativity in the context of an NPD project, within Philips. The first study was of Huisman (2006). However, no other studies of the SOQ in the context of the NPD have been found. This leads to four questions to be considered:

1. Can NPD team members be influenced by experiences they have in other projects? This may influence the perceptions they have of recurring patterns of behavior, attitudes, and feelings that characterize life in the considered NPD project;
2. Does the organizational climate change during an NPD project? As a result it has to be questioned, how activities within the NPD projects can be related to phases of the NPD. How should a longitudinal study be executed?
3. How should the scores of the SOQ be interpreted, since the NPD itself continuously changes? What should be the norm of results of the SOQ during the NPD?
4. Do the results of the SOQ, in the context of NPD, really cover the relevant aspects of the organizational climate for creativity? These questions lead to the assignment presented in the next section.

[2] Part of the interest in semiconductors has been sold during this master thesis with as result that it will be no longer recognized as a product division of Philips.

1.5 Assignment

The assignment consists out of the following activities:

- Design a longitudinal study of the organizational climate for creativity in teams during the NPD project at Philips;
- Develop and answer research questions with regard to the validation of the measurement of the organizational climate for creativity;
- Present feedback for practical use of the SOQ.

In order to execute the activities of the assignment, the empirical cycle (Van Aken, Berends , & van der Bij, 2004) has been chosen, to structure the study. With this research method the following problem formulation could be answered: Which aspects of the *organizational climate for creativity, creativity itself*, and *teams*, should be considered when measuring the organizational climate for creativity in teams during the NPD project longitudinally?

1.6 Validation of the SOQ

The objective of this study is to improve validity of the SOQ. In order to validate the SOQ in the context of NPD, four parts of the study have been identified, which are:

1. It has been questioned if a team is an appropriate research measure for the organizational climate during the NPD. Since NPD projects come in all different sorts and sizes, it has to be examined if the members of an NPD project can be regarded as a team. Instead, either too few or too many employees work in an NPD project to categorize it as a team. Furthermore, it has to be studied if perceptions of the organizational climate of team members can be influenced, by interacting with members outside the NPD project. This effect may affect the measurement of the organizational climate for creativity in the considered NPD teams;
2. In order to determine if the scores of the SOQ change, the organizational climate has been studied longitudinally. As a results SOQ scores in specific parts of the NPD can be measured. A norm has to be established that may be considered as optimal scores on the SOQ in the context of NPD at different phases. This norm can be established by regarding the relationship between the level of the organizational climate for creativity and the innovativeness of the organization. If an organization has a 'better' organizational climate for creativity it is supposed to be more innovative (Isaksen, Lauer, Ekvall, & Britz, 2001; Isaksen and Lauer, 1999, 2001, 2002). However, this relation can be questioned, because it is not sure if employees should remain very creative during the development of new products. As a consequence, while employees are actually working on an innovation, they may not need a 'suited' organizational climate for creativity. Furthermore, a longitudinal study has the advantage that the quality is higher then former SOQ validation studies. In those studies the organizational climate was only measured after the project activities had ended. Quality is higher since this study should contain less retrospective bias. A longitudinal study has the advantages that it contains less bias, because in contrast to other studies no retrospective sense making of complex past processes is needed (Brown & Eisenhardt, 1995). No longitudinal use of the SOQ has been described by Mathisen and Einarsen (2004), who reviewed all published research of the SOQ questionnaire. Finally, measuring at different phases, contributes to the understanding of the changes of organizational climate during the NPD;

3. The construct validity of the SOQ has been questioned, and therefore the organizational climate has been measured with multiple methods. Besides the SOQ also interviews have been used. So reliability has been increased by using an alternate form (Yin, 1994). Furthermore the use of interviews also increases understanding.

Since this is a longitudinal study and the throughput time of an NPD projects is longer than the time span of this study, no conclusion about predictive validity regarding commercial success, can be made.

1.7 Structure of the rapport

The background of the the organizational climate for creativity in teams during the NPD process, and the research questions are stated in chapter two. In chapter three the research design is explained. In chapter four the results related to the research questions are presented. Finally in chapter five, discussion with recommendations for future research and practical use are presented.

2 Theoretical and practical background

The chapter provides background information about four parts of this study, as presented in section 1,6. First, a definition of a team and the relation of a team with the rest of the organizational will be considered. Second, background information about the longitudinal study will be presented. Third, the expected results of the SOQ during the NPD are discussed. Finally, construct validity of the SOQ will be considered.

2.1 Teams as level of analysis

In order to study the organizational climate for creativity in the context of the NPD, first it has to be determined if NPD teams, as a level of analysis is appropriate. It has to be considered if groups of employees may be regarded as a 'team', because there can be large differences between NPD teams. Furthermore, it is questioned if the perceptions of the team members, of the recurring patterns of behavior, attitudes, and feelings that characterize life in the considered NPD project, can be influenced by members outside of the team. Therefore the relation of the NPD team with the rest of the organization should be considered because it might affect the climate for organizational for creativity in the team.

2.1.1 NPD project Teams: Team Size, Task interdependence

The research unit of this study is a team. But, it is not clear if in the regarded NPD projects real teams are used. Can a team of 2 or 3 members be regarded as a full team? Can an employee who develops the products on his own, and only presents his findings to his boss be regarded as a team member? According to West and Markiewicz, (2004), teams consist of a group of employees which have the following characteristics: 'They share objectives, they have the necessary authority, autonomy and resources to achieve these objectives, they have to work closely and interdependently to achieve these objectives, they have well-defined and unique roles, they are recognized as a team, and they include no fewer than three and no more than 15 members' (p. 11).

Since all considered NPD project have been provided a budget, it is assumed that they have the necessary authority, autonomy and resources. It is not certain that the considered teams in this study, within Philips, have all these characteristics and as a result it is not certain if these so called teams may be addressed as teams. Because there are different NPD projects, there are also different NPD teams and thus, team size and task interdependency can be questioned. It is not sure if a group of employees can be regarded as a team.

In summary, team size and team interdependency are important to identify a group of employees as a team.

Team size: should be at least 3 and maximal 15 members.

Task Interdependence: is defined as: team members have to work closely, and 'need' each other to achieve their objectives.

As a results it can be determined if a group can be perceived as a team. This leads to the following questions:

Q1: What is the team size?

Q2: Is there task interdependence in the teams?

2.1.2 Partial Inclusion: interaction of the team with the organization

NPD team members may be, besides the activities within their NPD project, also be involved in activities outside the NPD project. Members may have interaction with different members throughout the organization. As a result, it is possible that the perceptions of the organizational climate for creativity, of NPD team members may be influenced by other organization members. If this should be the case, then it is not sure if it is really the organizational climate of the considered NPD project that has been measured.
In the context of the NPD process, individuals work in cross-functional project teams, but often also work in their own profession. As a consequence the employees have partial inclusiveness. This means that an individual occupies multiple organizational roles and can be influenced by membership in all of them. According to Drazin et al., (1999) partial inclusiveness can complicate research, considering multiple levels in the organization, because effects can no longer be attributed to membership of a single group. In contrast, the members can be influenced by other factors outside the group. As a consequence, the organizational climate can not simply be adjusted in order to enhance creativity, because it is not clear what influences this organizational climate. For the validity of this study this is also interesting, because it is not clear if the measured organizational climate can be really addressed to the particular situation of the NPD team. As a consequence it is not certain which organizational climate is measured.
Retrospective studies of the organizational climate (Amabile, 1996; Isaksen et al, 2001; Isaksen , & Lauer 2002) do not consider partial inclusion. As a consequence it is not clear if the innovative results can fully be ascribed to the team and if the organizational climate is really the perception of the organizational environment within the team rather than the organization. Perhaps employees of other teams influence the organizational climate.
In summary, the question remains if the organizational climate of NPD teams, often cross-functional, is influenced by the organizational climate of the profession or department.

> *Partial inclusion:* is in this study defined as the part per time unit, that members are working on the NPD project.

This leads to the following summarized question:

> *Q3:* What is the degree of inclusion of the team members during the NPD process?

2.2 Design of a longitudinal study

Before, the development of a norm can be developed, first further explanation of the design of the longitudinal study is necessary. First, the Situational Outlook Questionnaire (SOQ), is presented. Second, understanding of the New Product Development (NPD) is elaborated. Finally, creativity is considered in relation to the NPD.

2.2.1 The measurement of the organizational climate for creativity

The climate for creativity and innovation can be measured by questionnaires (Amabile et al., 1996; Anderson & West, 1998; Isaksen et al., 2001). The Situational Outlook Questionnaire (SOQ) (Isaksen et al., 2001) focuses on the climate for creativity and change by assessing the interaction within the organization or subgroup.

The questionnaire contains 53 questions on nine dimensions. These dimensions of the SOQ are presented in Table 2-1.

Table 2-1, Description of the SOQ dimensions

Challenge & involvement	The degree to which the people of the team are emotionally involved in its operations and goals and find pleasure and meaningfulness in their job.
Freedom	The independence of behaviour exerted by the members of the team. In climates with a great deal of freedom people are given autonomy to define much of their own work
Idea support	The ways new ideas are treated. In the supportive climate managers and colleagues receive ideas and suggestions in an attentive and receptive way and there are possibilities for trying out new ideas.
Trust & Openness	The degree of perceived emotional safety in relationships. When there is a strong level of trust, everyone dares to present ideas and opinions since initiatives can be taken without fear of reprisals or ridicule in case of failures.
Playfulness & humour	The perceived ease and spontaneity, a relaxed atmosphere with laughter and jokes.
Debates	Encounters, exchanges, or clashes among ideas, viewpoints, and differing experiences and knowledge. Many voices are heard and people are keen on putting forward their ideas.
Conflicts	The degree of emotional and personal tensions in the team. In climates with high levels of conflict, groups and individuals dislike each other and there is considerable gossip and slander.
Risk taking	The tolerance of uncertainty in the team. In the high risk-taking climate, decisions and actions are rapid, arising opportunities are seized upon, and concrete experimentation is preferred to detailed investigation and analysis.
Idea time	The amount of time one can use for developing new ideas. Teams characterized with much idea time are giving possibilities to discuss and test impulses and suggestions that are not planned or included in the task assignment.

Based on Isaksen et al., (2001)

In former studies (Isaksen et al.,2001; Isaksen & Lauer, 1999, 2001, 2002) high levels on all the scales, (conflict opposite score) are supposed to be more innovative than organizations with the low scores.

2.2.2 NPD project

This section will briefly present an overview of the NPD project. This overview of the NPD project enables comparing different cases with each other based on their position in the NPD project. First, a general overview of the NPD project will be presented. Second, the Fuzzy Front End (FFE) will be studied in depth, because it is regarded as the beginning of the NPD in the study. Third, the Opportunity Creation Process (OCP), containing a brainstorm session will be explained, because it may serve as a starting point for this longitudinal study. Finally, a brief overview of the Function Creation Development Process (FCP) will be presented, because during this study, many NPD projects are situated in this part of the NPD.

2.2.2.1 Stages of a generalized NPD project

The literature has provided several models of the NPD project (Cooper, 1990; Ulrich & Eppinger, 2006). A straightforward model to present an overview of the NPD project is the 'Integrated Product Development' model. This model was developed by Andreasen & Hein (1987), and is presented in Figure 2-1. The NPD project starts with generating ideas, based on the needs of market or the possibilities of a new technology (Burgelman & Sayles, 1986 in Burgelman Christensen, & Wheelright, 2004, p 682). These ideas are further developed and eventually transformed into a concrete product. Furthermore, attention is paid to the production process in order to produce the product on full scale.

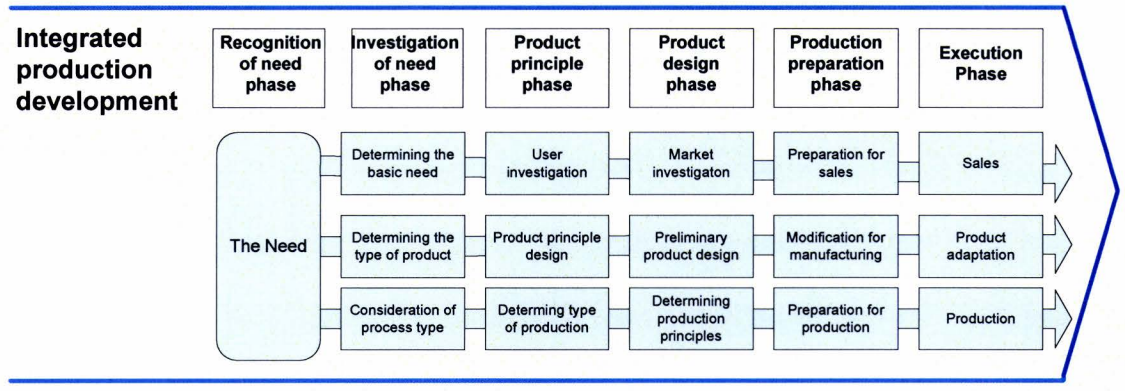

Figure 2-1, 'Integrated Product Development' model (Source: Andreasen & Hein, 1987)

The different phases are:

- *The investigation of needs phase:* in this phase the needs in the market are identified and a decision is made whether or not to start activities to meet these needs;
- *Product principle phase:* The way in which the product will be used has been determined and designed. A definition of the principles of the composition of product and the production process is necessary to determine the type of production technique to be used. As a result, a rough estimation of the costs can be made;
- *Product design phase:* The primary goal in this phase is to present more details of the product and to demonstrate that the product actually works. It is important that when the chosen design is in production, it eventually will meet its expected sales forecast. Before extensive investment in the next phase can be made, first a reasonably certain calculation of the cost is necessary;
- *Production preparation phase:* The goal of this phase is to demonstrate that the product can be produced. Both the product as well as the production process has to be tested in order to determine if they are mature and certain reliability has been established;
- *Execution phase:* This phase is the last phase of the NPD process, resulting in continuing production and sales.

In practice, many steps of the innovation process are executed parallelly (Buijs, 2003; Koen, Ajamian, Burkart, Clamen, Davidson, D'Amore, Elkins, Herald, Incorvia, Johnson, Karol, Seibert, Slavejkov, & Wagner, 2001; Koen, Ajamian, Boyce, Clamen Fisher, Fountoulakis, Johnson, Puri, & Seibert, 2002). In the linear model mentioned before, no iteration is present. Besides a logic innovation model presenting all the sequential steps the parallel activities in real-life innovation teams have to be taken into consideration as well (Buijs, 2003).

2.2.2.2 Applied Technologies model of the NPD project

After this general overview of the NPD project, a NPD project at Philips will be described.
Each product division of Philips has its own NPD projects. In order to compare the different NPD project of the product units, Applied Technologies have developed the 'Stargate model', see Appendix II. The advantage of this model is that the milestones of every product unit are presented.
With the milestones presented in the 'Stargate model', different NPD projects can be compared with each other. Furthermore, NPD projects can be positioned within an overview of the NPD. They can be related, because the milestones in the 'Stargate' model are divided based on the phases of a general model of the

NPD. This model is so general that it can be applied to all NPD projects of every business unit. The 'Stargate model' is based on the 'Integrated Product Development' model of Andreasen and Hein (1987). Part of both models are presented in figure 2.2, where the similarities can be observed.

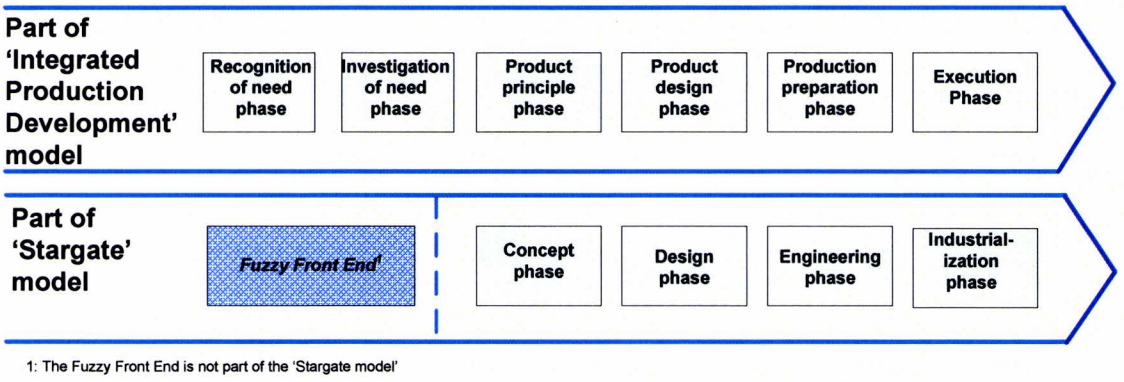

Figure 2-2, Part of the 'Integrated product development' model and part of the 'Stargate' model. (Source: Andreasen & Hein, 1987 and Philips Applied Technologies, 2006)

In contrast to the first two phases of the 'Integrated Product Development' model, these phases are blank in the 'Stargate' model. In Figure 2-2, these two phases are assigned to the Fuzzy Front End. As explained in the following section (2.2.2.3), projects in the FFE do not posses clear milestones, and therefore have no concrete referent points. Therefore, this part of the NPD is not included in the original 'Stargate' model. The terms of the 'Stargate' model, presented in Figure 2-2 will be used in this report.

2.2.2.3 Fuzzy Front End (FFE), the Beginning of the NPD

In order to start monitoring the NPD project, a clear starting point is necessary. How can this stating point be recognized? This beginning part of the NPD can be controlled to a lesser extent, and is therefore often regarded as fuzzy. Hence the name Fuzzy Front End (FFE). First, it will be explained why the FFE differs from the rest of the NPD project. Secondly, the balance between creativity and control at this stage is discussed.

Differences between FFE and the rest of the NPD project

'The FFE tends to have a more fuzzy nature, often with no clear beginning, multiple inputs, no well-defined throughput process, creativity and serendipity playing crucial roles, participants getting involved and dropping out in unplanned ways, no clear interface with the planning part of the Front End' (Aken and Nagel, 2004, p1). Creativity is needed in the FFE in order to generate ideas. Achieving a balance between creativity and discipline is crucial in the front end (Khurana and Rosenthal, 1998). According to van Aken and Nagel (2004) one has to create the right balance between free exploration and business-direction in organizing the FFE. Too much direction kills exploration, creativity and serendipity, while too little direction hurts overall FFE-performance. Innovative behavior comes at the price of predictability and control (Brown and Eisenhardt, 1998).

As is shown in Table 2-2, the nature of work, commercialization date, funding, revenue expectations, activities and measures of progress are fundamentally different between the FFE and other phases of the NPD process (Koen, et al., 2002, p. 6).

Table 2-2, Differences between the fuzzy front end and the new product development process.

	Fuzzy Front End	New Product development
Nature of Work	Experimental, often chaotic. Eureka moments. Can schedule work, but not invention.	Disciplined and goal oriented with a project plan
Commercialization date	Unpredictable	High degree of certainty
Funding	Variable. In the beginning phases many projects may be 'boot legged' while others will need funding to proceed.	Budgeted
Revenue expectations	Often uncertain with a great deal of speculation	Predictable with increasing certainty, analysis and documentation as the product release date gets closer
Activity	Individuals and team conducting research to minimize risk and optimize potential	Multi-function product and/or process development team
Measures of progress	Strengthened concepts	Milestone achievement

(Source; Koen et al., 2001 & 2002)

It can be concluded from Table 2-2 that the FFE has a more experimental nature and the rest of the NPD has a more disciplined character. The FFE is generally regarded as one of the greatest opportunities for improvement of the overall innovation process (Khurana and Rosenthal, 1998; Koen et al., 2002; Van Aken and Nagel, 2004).
The FFE can be situated in Figure 2-2 in the phases 'recognition and investigation of the need' but also in front of this phase where there might be no official project. Often it is not clear what the starting point and the input of the FFE is. It is fuzzy. The output of the FFE is characterized by a preliminary product definition and a preliminary project planning (Khurana and Rosenthal, 1997; 1998). This can be regarded as the first milestone of the NPD project. From this point on management can make a go/no-go decision to assign resources to the start of further product development. In the 'Stargate' model this could be considered as the starting point of the concept phase.

The 'Speed' Model

As mentioned above, the nature of the FFE is different from the rest of the NPD project. The main reason for the difference is that the outcome of research activities has to be transformed into a development project. A developed technique by R&D may be applied in a range of products, while the R&D research it self does not stop. Thus although results of the research are used for the development of a new product, at the same time the research itself may continue. Most of the research activities are not directly connected to a specific NPD project. This is in contrast to activities in the rest of the NPD project. Creating a product concept (see 'Stargate' model in Figure 2-2) is only related to that very product.

This relation between research activities in the FFE and the development activities in the NPD can be best explained with a simplified version of the 'Speed' Model, a model of new product development of Philips. (The 'Speed' model is presented in Appendix III) This model differs of the NPD model of Andreasen, & Hein (1987), because business and technology know-how generation are included as part of Research and Development. This business & Technology Know-how generation can be compared to the recognition and investigation of the need in the NPD model, presented in Figure 2.1. This need comes from new technological possibilities or market changes and can be addressed as 'technology push' and (Burgelman &

Sayles, 1986 in Burgelman et al, 2004, p682).) 'need pull'. The 'Speed' model gives more insight in the FFE, or the 'recognition of need phase', because it gives a better description of this phase. To give an example of business know-how generation, perceived market trends can be assimilated into new products. If a 'designer' states that young people do not want products but 'experiences', then perhaps research will be started in order to study how products can provide such 'experience'. Often both business and technology know-how can be applied to different products. Generating business and technology know-how can be perceived as continuous providing a resource that can be used to make better products.

Based on this understanding of the FFE, the relation with the next step in the NPD can be better explained. The next step is product specific, and is called 'architecture and standard design creation', which can be compared to the product principle and product design phase of the NPD model. Activities in this step can be directly assigned to a product. The relation between generating know-how and creating a specific product is not straightforward, because both activities can influence each other. During the creating of a new product, it is possible that contributions are made to the research and vice versa while generating know-how opportunities for new products may show up. As a consequence, the relation between continuous research activities and the product related development is not fully clear.
To conclude, it is the shift in perspective between 'research', know-how generation, and the development of new products that makes it 'fuzzy', because in both phases technique is used and how the new product should be is not clear. In this study a clear distinction will be made between the FFE and the rest of the NPD. Development activities are regarded as part of the FFE if they contribute to determining *'What'* should be made, just as business and technology know-how generation. Activities related to *'How'* the product should be made, are regarded to be part of the NPD.

2.2.2.4 Opportunity Creation Process (OCP), Brainstorm Session, and the Functional Creation Process (FCP)

In order to apply technology of 'research' in a new product, an 'Opportunity Creation Process' OCP can be started. It can be used to create new products, opportunities, based on the know-how created in the 'business and technology know-how generation' (see Appendix III). As such, it is the crossing point between the 'research' and 'development'. Although the OCP is mostly used in the FFE, it can be used in almost every phase of the NPD to solve development problems. Starting point in this study is the OCP in the FFE. This process is used to support the generation of new ideas and selection of processes for new technologies, products and product functions.
The OCP consists of six steps; (1) preparation, (2) idea generation, (3) screening, (4) concept creation, (5) short investigation, (6) ranking & decision-making. Heart of the OCP is the idea generation process. Idea generation takes place in a brainstorm session. Guidelines for a successful brainstorm session direct behavior to be more creative. These guidelines are: criticism is not allowed, freewheeling is welcomed, quantity is wanted, combinations and improvements are sought (Husiman (2006), based on Osborn, 1953).

An OCP is often used at the start of the concept phase. The creative result of this phase then has to be further developed. Similar to the 'product principle phase' (see Figure 2-1) the purpose of the concept phase is to make a composition of the product, an architecture. The product division 'Philips Domestic Appliances & Personal Care' calls this the Functional Creation Process (FCP). This term can be used to divide the concept phase into two parts. The first part is the OCP and the second part the FCP. Thus, at the end of the concept phase the generated idea is further developed, which is called FCP. Therefore in this report, the term FCP will be used when referring to the second part of the concept design.

In the concept phase, a distinction between the OCP and the FCP will be made, by the fact if *'between'* or *'within'* functions is considered. In the OCP in the concept phase is considered how the product should be. Therefore, relations *'between'* functions are discussed. In the FCP, in more detail is focused on the different functions of the functions. As a result the focus lies *'within'* a function. So, a distinction between the OCP and the FCP is made in this study, by the shift in focus *between* or *within* functions.

2.2.3 Creativity and innovation and their relation in an organizational context.

In the introduction, a definition of creativity has been presented which is very general. Since the NPD project changes over time, perhaps creativity changes as well. Therefore the understanding of creativity has to be enlarged.

Definitions of creativity and innovation

Although the definitions of creativity and innovation look quite sound, there is no full consensus in the literature. By defining creativity as useful and novel, the focus lies on the outcome of the creative process (Drazin, Glynn and Kazanjian, 1999). The problem with creativity as an outcome is that both novelty and usefulness are based upon subjective judgments, and therefore are domain and time specific (Ford 1996). Measuring the degree of creativity is to a certain extent subjective. This subjectivity can be a problem if one has the aim to improve the organizational climate for creativity in order to enhance creativity. It could be difficult to determine if creativity of people really has been enhanced, and thus if a team really develops more and better ideas. At Philips, different types of creative outcome are reviewed by employees inside and outside the NPD team, in order to increase objectivity. As a result the definition of creativity regarding the outcome of the creative process can be used.

Four types of creative outcomes

Four types of creative outcomes are considered in this study, identified by Huisman (2006), which are; raw ideas, concepts, white cards and support of principles/ customer. After a raw idea is identified by the NPD team as a potential idea for the project, it is regarded as a concept. If the inventor beliefs his or her idea is creative enough, the idea may put on a white card. If after a scan of existing patents, is shown that an idea is new, the white cards is reviewed by a commission. After approval, a patent application is filed. However, since the time span of this study is shorter than the patent application period, this outcome is not included in this study.

The best recognition that a creative idea is new and useful is the approval to further develop the idea. This means that the project principle/ customer has assessed the development of the ideas as new and useful enough. Support consist of continuation of the project and/ or appreciation for the results. This can be assessed in interviews.

A new definition of creativity

Defining creativity as producing a novel and useful idea in any domain (Amabile, 1996) is of course very general. With this definition, every designer who designs to meet requirements can be regarded as creative. The designed solution is new, otherwise it does not need to be developed and it is useful because it meets the requirements, assumed that the requirements make sense. As such, creativity is present at every stage where design takes place. If innovation is regarded as a successful implementation of a creative idea, then innovation also takes place continuously during design. With this in mind, everyone who develops is assumed to be creative. But developing within requirements is something else than developing without

these requirements, and creating new products thinking 'out of the box'. This seems to be another kind of creativity.
Unsworth (2001) makes a similar distinction, considering the open and closed problem formulations. This distinction can also be found in the NPD project itself, as has been shown in section 2.2 where the difference between the FFE and the rest of the NPD is explained. Fully new ideas often have a high degree of uncertainty, because both the technology used and the products have an unclear form and function. According to Sitkin, Sutclife, & Schroeder, (1994) uncertainty can be defined as the idea that information is incomplete with respect to attributes, causes, or effects of the phenomena of interest. Beside the lack of information the creative process itself is uncertain. As a result, generating such ideas can be less controlled, similar to FFE (section 2.2.2.3).

In this report, being creative in an open question, thus without many specifications, is defined as, generating substantial new ideas that can be further developed into radical innovations.

> *'Radical innovations'* involve entirely new product and service categories and/or production and delivery systems (Burgelman et al., 2004, p3).

During the NPD project, the design of the new product becomes clearer and as a result further development has to take place within more specifications. Solving a question with many specifications is formulated as a closed question.
In this report, being creative in a closed question, thus with more specifications, is defined as generating new ideas that can be further developed into incremental innovation .

> *'Incremental innovations'* involve the adaptation, refinement, and enhancement of existing products and services and/or production and delivery systems' (Burgelman et al., 2004, p3).
> 'Incremental innovations involves only a minor modification in the product or process' (Henderson and Clark, 1990 in Burgelman et al, 2004, p441).

The concept of incremental innovation is clearly different from the notion of radical change. In fact, incremental innovation may actually slow down the development of new ideas, solutions, or products by focusing on minimizing variation in processes, products, and services. And radical innovation may hinder quality because of the greater variability related to the new and uncertain product.
As a result in this report a distinction in two types of creativity will be regarded.

- The first form of creativity has as outcome radical innovation;
- The second form of creativity has as outcome incremental innovation.

2.3 Development of a norm

As is presented in section 2.2.1, the scores of the SOQ (opposite conflict) correlate with the innovativeness. However, this does not mean that a higher score of the SOQ is always better. There does not exist a perfect climate score (Isaksen& Lauer, 1999; Isaksen, Ekval, Akkermans, Wilson, & Gaulin, 2006). As such a 'maximum' score does not necessary indicate to be the best outcome for an organization (Isaksen, Lauer, 1999). Instead it should help to determine your own situation and perhaps judge if a dimensions is present in the right proportion (Isaksen & Lauer, 1999; Isaksen & Tidd, 2006). According to Isaksen et al., (2006) the results of the SOQ should be compared to general averages of innovation and stagnated organizations, and to the average scores for the organization where the SOQ is administered. However the SOQ has not been used in teams during the development of a new product. It is not clear if the need for creativity remains high since the NPD project itself changes. The validity can be questioned because it is not sure if NPD teams which are developing new products always need a 'suited' organizational climate to be

creative. As a result it seems that there exists no norm which can be used in order to interpret the results of the SOQ in this situation. Therefore more background information about the changes during the NPD will be presented.

Two types of focus on quality in the FFE and the NPD project

Isaksen and Tidd (2006) state that two types of focus are necessary during an NPD project. First, in order to be innovative there has to be a focus on 'doing different'. Later during the NPD project, a different focus of 'doing what we do but better' is necessary. With this focus 'good practice' routines of the operations can be established.

In order to explain the change in focus literature related to quality is considered. In the vast amount of literature about quality many different definitions of quality are presented. According to Hoyer and Hoyer (2001) and Andreasen and Hein (1987), definitions of quality can be divided into two categories. In the first category, quality is regarded as meeting a fixed set of (numerical) specifications with measurable characteristics during the production of the products or delivering services. It is about controlling the achieved quality so it has an acceptable small statistical deviation from the properties of the ideal. The focus is on reducing variability. Variability can be explained as deviations of a desired level.

The second category emphasizes how products and services satisfy customer expectations. It is about defining and making the right choice of the ideal quality. The latter category is independent of the first one and more difficult to measure. In this report the two types of quality will be respectively regarded as 'control quality' and 'design quality'.

A change in focus is present in the NPD project where in the front of the NPD the emphasis lies on generating new ideas and in later stages control and coordination must be emphasized (Naveh, 2005). Besides innovation and quality a third business imperative, efficiency, can be identified. According to Amabile (1998), sometimes managers are designing organizations that systematically crash creativity in order to work towards imperatives, mentioned above. 'While innovation is about breaking the rules and pushing the envelope, quality requires adherence to rules and standards' (Miron, Erez, & Naveh, 2004, p.178). In order to be innovative, and thus create new products, development often has to consider time and budget limitations. Therefore innovation often has to compete with efficiency. The different imperatives do not necessarily have to impede each other. Amabile (1998) shows that it is possible to create organizations in which business imperatives are attended to and in which creativity flourishes. A focus on efficiency with scarce resource, can sometimes increase creativity. For example in certain conditions time pressure can spur innovation (Amabile 2002).

According to Naveh (2005) there exists a vast amount of literature on innovation and efficiency as separate constructs, but the relationship between the two, particularly in the context of NPD is not provided in the literature. The same could be remarked for innovation and quality. Both literature on innovation (Amabile, 1996; Isaksen et al., 2001; Isaksen and Lauer, 199; 2001; 2002) and literature on quality (Hackman & Wageman, 1995) do not provide characteristics describing when the focus on innovation or quality is appropriate. Although the focus on 'design quality' does not necessary impede creativity it may hinder the creative process, when is tried to control creativity. As a result it is not clear how the focus on these imperatives, innovation and quality, should be.

To conclude, since the NPD project continuously changes, there exists no norm for such a situation, it is not clear how the score for a separate dimension should be interpreted. Since the focus shifts to reduce variation and stay within budget, it is expected that the organizational climate changes. Because the variation decreases, it is assumed that the need for creativity decreases, which leads to the following research question:

Q4: Do the scores of the SOQ decrease, during the NPD project?

2.4 Multiple methods

The SOQ claims to measure the organizational climate on nine dimensions. Construct vaidity can be increased by relating its results with the results of another test. In no other studies the results of the SOQ have been compared with another measurement of the organizational climate (Mathisen and Einarsen, 2004; Isaksen et al., 2006). Scores on the SOQ has been correlated with the 'KAI' measure and a relationship has been found (Isaksen, Lauer, 1999). But this is not a measure for the organizational climate. Since other measures of the organizational climate for creativity use different dimensions, the results cannot be compared straightforwardly. Therefore, the results of coded interviews will be used. The use of interviews furthermore also contributes to the understanding to the scores on the dimensions. This leads to the following research question:

Q5: Are the results of the SOQ related to the results of the interviews?

3 Method

The previous chapter focused on the theoretical and practical background of the organizational climate for creativity during the NPD project. This chapter presents an overview of the research methods employed in this study. First, the sample design will be explained. Second, the procedures to obtain the data are presented. Finally, the analysis of the data is discussed.

3.1 Sample design

To validate the use of the SOQ in the context of NPD, the organizational climate for creativity has been studied longitudinally in NPD projects in NPD teams. Since new products are developed within teams, NPD teams have been chosen as research unit. Selection of NPD teams has been based on previous established consultancy relationship with Philips Industry Consulting.

Selection of NPD teams

Initially, the organizational climate for creativity has been measured in four NPD teams. However, two NPD projects (project 3 and project 4) have been stopped. Therefore, extra NPD projects have been selected. In order to acquire data in later phases of the NPD, two additional NPD projects that were in a later phase (project 5 and project 6) have been selected. (Also these two selected NPD projects have a previously established consultancy relationship with Philips Industry Consulting.)

Selection of measurement points

First, the frequency of the measurements has been considered. In this study it is assumed that NPD team members do not want to fill out a questionnaire too often, because they may lose interest. On the other hand, it is assumed that the members of NPD teams will change during the NPD project. Therefore, it is concluded that there can be measurements over the complete NPD project, but they should not take place too close after each other.

Below, the measurement point(s) within the separated phases will be discussed. An overview of the different measurement points is presented in Table 3-1: Four measurement points have been selected to measure the organizational climate for creativity.

- The *first* measurement point is located in the Fuzzy Front End (FFE). In this phase of the NPD, is decided 'what' should be developed;
- The *second* and the *third* measurement point are located in the concept phase. In the concept phase, is determined 'how' the product should be developed. At the end of this phase an overview of all functions is presented;
- The *fourth* measurement point is located in the design phase. In the design phase these functions are further developed in more detail.

In the FFE, the Opportunity Creation Process (OCP), has been chosen as measurement point. In section 2.2.2 it has been stated that the start of the NPD is sometimes hard to identify. The OCP may serve as clear starting point of the longitudinal study.

Two measurement points can be identified in the Concept phase. A separation has been made between the starting point of the concept phase, and the further development of a concept. In the concept phase NPD

teams may start their NPD project in the OCP. However, in the concept phase NPD projects may also develop functions of the new product in the Functional Creation Process (FCP).
In the design phase, no specific process, has been assigned. The results can be distinct of the concept phase and of the next phase, the industrialization phase, where the product is verified.

No measurement points have to be identified in later phases of the NPD. Since the NPD projects are studied longitudinally and their time span is longer than the time span of this study, only at a limited part of the NPD measurements have taken place.
The organizational climate for creativity has been measured only twice in this study. Normally, an OCP is supposed to have a throughput time of approximately 6 weeks. However, in this study, the throughput time was longer, because NPD projects were delayed during the summer. The second measurement of the NPD project within NPD teams was related to 'development' NPD activities, instead of in an OCP, as in the first measurement. The second measurement took place at the end of the summer.

Table 3-1, The selected measurement points of the longitudinal study for the organizational climate for creativity during the NPD project.

Phase in NPD	FFE	Concept phase		Design phase
subproject	OCP	OCP	FCP	-
Measurement point	1	2	3	4

The exact numbers and percentages of the data collection are presented in Table. 3-2. The response rates of the surveys are also included.

Difference between 'results of the brainstorm session' and 'results of development activities'
A remark has to be made, that a distinction has been made between two types of activities, but that they are both part of the NPD process;

- 'brainstorm'; results of the measurement related to brainstorm sessions;
- 'development', 'results of the measurement related to general development activities.

See Table 3-2 for an overview of the measurement divided in the two categories during the studied part of the NPD.

Table 3-2, Numbers, response rate of the filled out surveys, & interviews, and type of activity.

	Place in NPD: **OCP** in **FFE**	Place in NPD: **OCP** in **concept**	Place in NPD: **FCP** in **concept**	Place in NPD: **Design**	Nr. of interviews	
	1) Nr and % of response on survey 2) brainstorm / development	1) Nr and % of response on survey 2) brainstorm / development	1) Nr and % of response on survey 2) brainstorm / development	1) Nr and % of response on survey 2) brainstorm / development		
Project 1	7 (53%) Brainstorm	3 (100%)* Development			3	1[3]
Project 2		6 (37%) Brainstorm	5 (83%) Development		3	1
Project 3		3 (100%) Brainstorm			1	
Project 4	4 (57%) brainstorm				1	
Project 5			6 (66%) Development		3	
Project 6				7 (44%) Development	1	
Total Projects	3*	2	2	1	14	

** During this study, project 1 remained in the FFE, because the purpose of the activities was to show 'what' kind of product could be made, and not 'how' the product should be made. However, the second measurement of project 1, has been moved to the right to keep a good overview in table 3-2.*

As can be observed, the response rate of the SOQ can be regarded as moderate. The participation in interviews was excellent. All NPD teams that were asked for an interview cooperated.

The organizational climate for creativity has been measured only at the beginning of the NPD. As already mentioned, project 3 has been terminated and project 4 has been delayed[4]. Therefore project 5 and project 6 have been selected. In these two projects, the organizational climate of 'general' development activities in the NPD has been measured, instead of the OCP.

[3] Since the organizational climate of project 1 and project 2 have been measured twice, also twice interviews have been held.

[4] Project 3, has been terminated of organizational reasons. Project 4, has been delayed because the customer has put priorities differently.

Team sizes
Members of NPD teams may change often during the NPD, because employees with different skills are required for different activities within the NPD. The team size has been given by the NPD project leader. The team size, per measurement has been presented in Table 3-3.

Table 3-3, Team size per project.

Project Team Size	Project 1	Project 2	Project 3	Project 4	Project 5	Project 6
Brainstorm sessions	13	16	10	4	-	-
Development	3	6	-	-	9	16

Table 3-3 shows that team sizes are larger in the brainstorm sessions than in the 'general' development activities. Furthermore, three members of project 1, and six members of project 2, have filled out the SOQ twice.

3.2 Research procedures

Data collection methods
The organizational climate for creativity has been measured with two different methods. Besides the SOQ, interviews have also been used. The SOQ has been administered to all members of the NPD team. Interviews have been used to determine construct validity and to increase understanding of the organizational climate for creativity in the context of the NPD. Therefore, the interviews were not only held with the project leaders, but also with other members of the NPD teams of three projects. The additional interviewed NPD team members had the role of project principle or NPD developer.

Cooperation to fill in the SOQ and participate in an interview
Before the data collection started, first the facilitator of the brainstorm sessions asked for cooperation of the project leader of the NPD team. After the confirmation, a first interview was held to learn more about this particular project. Moreover, their estimation of the level of the presence of the dimensions of the SOQ was asked. After this interview, an e-mail was sent to the other members of the NPD team to ask to fill out the survey. After two weeks a reminder was sent to the members if they had not filled out the questionnaire yet. In some particular cases, after consultation with the project leader, it was decided to contact team members, by phone, to ask if they still wanted to fill out the questionnaire at all. In the meanwhile, concurrently, other interviews were held.

3.2.1 Measurement of the theoretical concept

Five **independent** variables have been chosen for this study:

1. Team size;
2. task interdependency;
3. partial inclusion of the team;

4. The organizational climate of creativity within NPD teams of NPD projects, measured by the SOQ. The nine dimensions of the climate for creativity are Challenge & Involvement, Freedom, Idea Support, Trust & Openness, Idea Time, Playfulness & Humor, Conflicts, Debates, and Risk Taking;
5. The organizational climate of creativity within NPD teams of NPD projects, measured by interviews, based on the dimensions of the SOQ.

Four **dependent** variables of creative outcome have been chosen for this study:

1. The number of raw ideas generated;
2. The number of concepts generated;
3. Contribution to idea submission (white card);
4. Support of the project principle/ customer. (determined based on interviews).

SOQ: Changes to the questionnaire

In order to administer the SOQ, a questionnaire of Huisman (2006) has been used. This questionnaire consists of a general part, presenting background information of the NPD project, and a more specific part containing the SOQ. At the start of this study, this questionnaire had to be adapted, because it was not designed for a longitudinal study. These changes are related to the added questions beside the SOQ. The modifications of questions can be divided into six categories:

1. Questions asking for the success of the OCP afterwards have been removed, since it is too early to answer these questions;
2. Questions have been changed to ask for their estimation of the success. The estimation of the success may be important, because the opinion op team members might influences their motivation;
3. Questions have been put into the correct tense, considering the present instead of the past;
4. A distinction has been made between a questionnaire for the project leader and the rest of the team members. Some questions are so general they don't need to be asked to every individual team member;
5. The names of the NPD phases have been altered to the current NPD phase, in which the NPD projects were located;
6. The last change has been to add some questions, asking how the need for creativity, quality, and efficiency was experienced and if these variables have changed since the prior measurement. These questions have been added at a later stage of the study.

Interview

The interviews were structured to make sure key topics were covered. The interviews were open-ended to explore new areas (McCutcheon & Meredith, 1993; Yin, 2003). Therefore the questions can be regarded as semi-structured. The questions for the first and the second measurement are included in Appendix IV. Because the questions were semi-structured, the duration of the interviews was variable. However, a minimum time of at least half an hour was required to ask all the questions. Most of the interviews required approximately one hour.

In order to compare the results of the interviews with the results of the SOQ, the following three steps have been used to analyze the interviews:

1. The answers has been interpreted;
2. The interviews have been coded at the level of answer, based on the open-ended questions. Coding consisted of two steps;
    a. First, parts of the interviews have been recognized as answer, making a distinction between relevant and less relevant parts of the answer.
    b. Second, scores have been assigned to the answers on a 4-point scale; in which 0= Not at all applicable; 1 = Applicable to some extent; 2 Fairly applicable; 3 = Applicable to a high degree. In order to assure the reliability of the coding, two independent persons (two graduate students) have coded the interviews independently. An instruction was presented to the second coder, which is shown in Appendix V.
3. The final step was to structure the coded parts, placing all the results of one dimension together. Based on these scores, the interviews have been compared with the results of the SOQ.

Results of other studies

In order to determine whether the organizational climate should change during the NPD, the results of the SOQ have been compared with results of one other study. It will be acompared with the results of Huisman (2006). This is a retrospective study of the organizational climate within Philips of (Huisman, 2006). The study of Huisman (2006) considers NPD projects, throughout the NPD. Since this last study is also conducted within Philips NPD projects, this may be a more relevant comparison, as the projects are likely to be similar in nature.

In order to present some additional results, which may be relevant to Philips, the results of this study have also been compared with the benchmark results of Isaksen et al., (2006[b]).

3.3 Data analysis

To compare the results of the SOQ of this study with the results of Huisman (2006), the Chi-Square test was used, which is most appropriate since all SOQ dimensions are of equal importance.

To determine the reliability of the coding of the interviews, related to the assigning of scores, by the two coders, the Cohen's Kappa test has been used. This test calculates the agreement between the coders.

In order to test if there is an association between the results of the SOQ and the interviews per dimension, the Spearman's rho test has been used.

Comparison between the means of the dimensions of the SOQ, of this study, and the results of (Isaksen et al., 2006[b]) and (Huisman, 2006), could not be tested statistically. No relevant statistics could be used, because the sample size was too low (n=4). Therefore, the results are presented graphically.

4 Results

The findings of this study are presented in this chapter. First, the research questions, related to NPD teams will be answered. Second, it will be tested if the scores on the SOQ decrease during the NPD. Third, the relationship between the SOQ and the interviews is considered. Furthermore, additional information, concerning the creative outcome and a comparison with benchmark results have presented in the last section.

4.1 Teams; research question 1,2, & 3

In order to determine whether NPD teams are appropriate research units, three research questions are presented in section 2.1. These questions are related to: team size, task dependency, partial inclusiveness.

Team size; research question 1

Research question:

Q1: What is the team size?

According to the definition of a team, a group of employees may only be regarded as a team, if the team size is at least 3 up till 15. The team size per project has been presented in Table 3-3.

Result:

As can be observed, two NPD teams have a team size of 16. These are; project 2, during the brainstorm session, and project 6, during 'development' activities in the NPD. Since, the team size is larger than 15, these groups may not be regarded as a team. Still the data has been used in this study, because the difference in team size with the definition is only limited to one member. The other teams of the project have an appropriate team size.

Answer research question 1:

Based on these results, it seems that a group of employees, who work on a project, may not directly be assumed to be a team, when the number of members is considered.

Task interdependence; research question 2

Research question:

Q2: Is there task interdependence in the teams?

It can be questioned if team members have to work closely, and 'need' each other to achieve their objectives.

Result:

Below an indication of the task interdependence is presented based on interviews. Relevant parts of these interviews are presented in Appendix VI.

- Project 1: The developer makes the prototypes alone, and so he does not work closely together with other members of the team;
- Project 2: The team members have to communicate to coordinate their work, so nothing is done twice like for example contacting suppliers;
- Project 3: Members have to discuss with each other to further develop the ideas/ concepts of the first brainstorm session;
- Project 4: This project only consists of a brainstorm session and a brief summation of the results. It is evident that during the brainstorm session there was task dependence;

- Project 5: Each member has a special task with a specific skill and competences. Once a week, there was a meeting to coordinate the different input. Furthermore engineers have task interdependence while helping each other during a test;
- Project 6: Task interdependence is inherent to product development because there is an interaction between the design and the actual results.

Answer research question 2:
Team 2 till 6 may be qualified as a team, because they have task interdependence.
But, it can be questioned if the team members within project 1 have task interdependency, since the developer only develops the prototypes alone. Therefore, the developer does not closely work together with other team members. The project leader only reviews the progress of the project periodically.

Partial inclusiveness; research question 3
Research question:
Q3: What is the partial inclusion of the team members during the NPD process?
It can be questioned if the perceptions of the team members, of the recurring patterns of behavior, attitudes, and feelings that characterize life in NPD projects, can be influenced by members without the team.

Result:
Below an approximation of the partial inclusion is presented based on interviews. Relevant parts of this interview are presented in Appendix VII.

- Project 1: The developer of this project has, periodically worked for 100% on another project during this NPD project. As a result the considered NPD project has been delayed;
- Project 2: The team members work also on other projects. On average, the team members worked approximately 2 days a week on the project;
- Project 3: Members of this team work on the project in their 'GEnerating INnovations, (GEIN)' time. This is approximaltely 10% of the time per week;
- Project 4: Since the activities in this project, besides the brainstorm session, were so limited, nothing can be said about partial inclusiveness;
- Project 5: Approximately 2,5 half day a week is worked on the project;
- Project 6: In the NPD team part, five people are approximately working for 30% on the project. Furthermore, there are approximately 15 other team members at different organizations that work 50% of the time on the project.

Answer research question 3:
Although this list just gives an estimation of the partial inclusiveness, it is clear that NPD team members do not only work on one single project at the beginning of the NPD. Instead they also work in other projects. As a result, it is possible that team members are also influenced by patterns of behavior, attitudes and feelings within other parts of the organization.

4.2 Norm, change in the organizational climate during the NPD: research question 4

Research question:

Q4: Do the scores of the SOQ decrease, during the NPD project?

In section 2.3 has been proposed that the scores of the organizational climate for creativity decrease. This is because the focus shifts during the NPD process, towards reducing variation, and staying within time and budget.

Results:

In order to answer the research question, the results of the SOQ of this study have been compared at two moments in time, and with the results of one other studies (Huisman, 2006). The relationship between the averages of the samples has been tested. Furthermore, the results have been interpreted with answers of the semi-structured interviews.

4.2.1 Results of the SOQ

The SOQ measurements of the organizational climate during the brainstorm session, took place in the FFE or the concept phase of the NPD. The measurement of 'general' development NPD activities, took place in the FFE phase, concept phase and the design phase (see Table 3-2). The results are presented in Figure 4-1 & Figure 4-2. For exact numbers, see Appendix VIII.

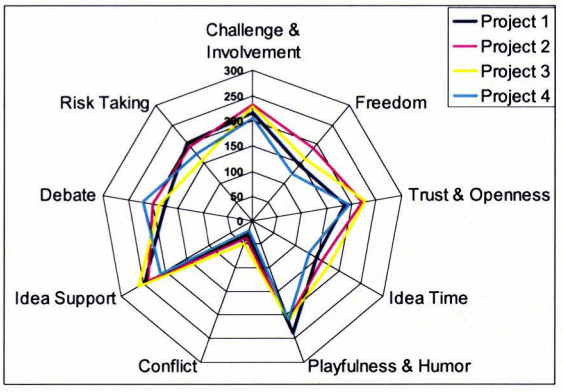

Figure 4-1, Results of the SOQ of the measurement during the brainstorm session.

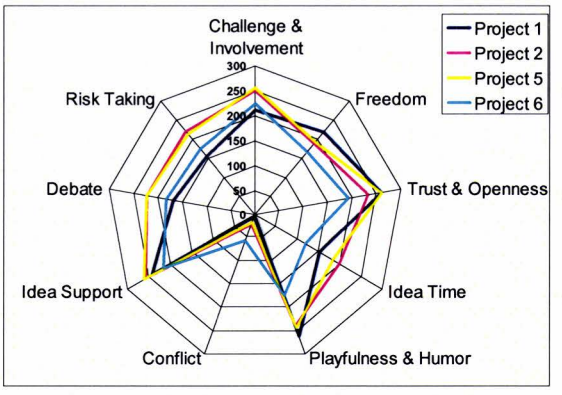

Figure 4-2, Results of the SOQ of the measurement of 'development' activities.

A remark has to made that the results of project 1 in the measurement related to the 'general' NPD development activities are not appropriate, since the team had to little task interdependency. Still the results have been included because the sample size is small. Observe that project 1 has no particular differences with the other NPD projects.

As can be observed, there is little variation between the results of the different projects in Figure 4-1. More differences between the scores of the SOQ in the NPD teams can be observed, in Figure 4-2. Especially, project 5 has higher SOQ scores (and lower score on conflict) in general. Project 6 has lower scores on the dimensions Trust & Openness, Idea Time, and Playfulness & Humor.

4.2.2 Overview differences

An overview of the differences between the results of the SOQ between the measurement related to the brainstorm sessions and the measurement related to 'general' development activities is presented in Figure 4-3.

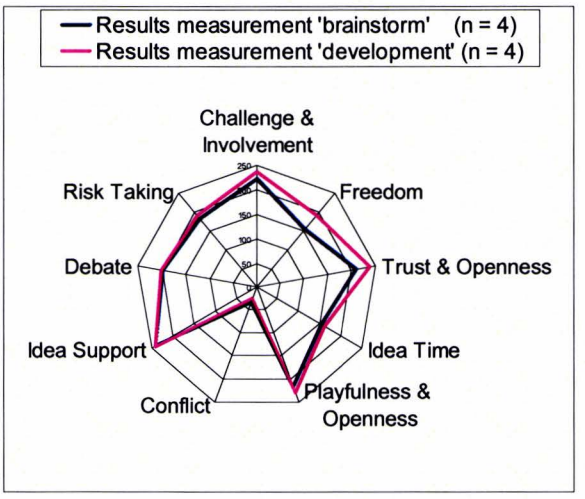

Figure 4-3, Overview of the results of the SOQ of the measurement related to the brainstorm and the measurement related to 'development' activities

The results in Figure 4-3 seem quite similar. However, the results of the measurement related to 'general' NPD development activities have higher scores on the following dimensions *;freedom, and Trust & Openess.* Note, that the results of the second measurement of this longitudinal study are not lower.

The average results of the measurement of development NPD activities are also used for comparison with the study of Huisman (2006), presented in Figure 4-4. This measurement is related to general NPD activities instead of a brainstorm session like the first measurement. This was a retrospective study of the organizational climate at the beginning of the NPD at Philips. So, both considered studies are related to the context of Philips. However, the study of Huisman (2006) considers NPD projects, throughout the NPD, and therefore a lower score is expected.

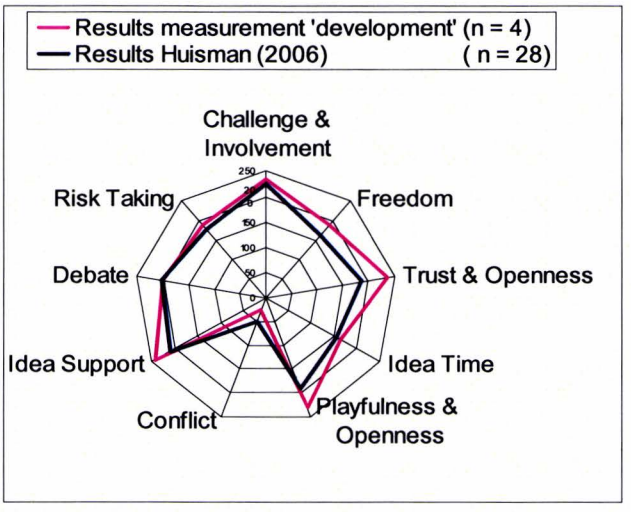

Figure 4-4, Overview of the results of the SOQ of the Second measurement and the results of Huisman, (2006)

The results of the SOQ presented in Figure 4-4 are mainly different in five dimensions which are: *Freedom, Trust & Openness, Playfulness & Humor,* (lower score) *conflict,* and *Idea Support.* The exact numbers of Figure 4-4, are presented in Appendix IX.

4.2.3 Test for difference of overall results of the SOQ

In order to determine if the scores of the SOQ change during the NPD, the following two relationships have been tested:

1. Relationship between the results of the 'brainstorm' measurement with the results of the 'development' measurement;
2. Relationship between the results of the 'development' measurement with the results of Huisman (2006). Since this last study is also conducted within Philips and directed to NPD projects, less differences with this study is expected.

In order to execute the chi-square test, the results presented in figure 4-3 and Figure 4-4 are used. The results are presented in Table 4-1.

Table 4-1, Comparison of total results of the SOQ with the results of this study and Huisman (2006).

	Brainstorm Measure	Development Measure
	Development Measure	Huisman (2006)
$M_1 = M_2$ d.f.=17, p= .95 Critical value: **27,59**	**6,10**	**18,01**
Interpretation	**Accepted**	**Accepted**

The overall scores of the 'brainstorm' measurement and the 'development' measurement are not significantly different. Also the overall score between the results of the 'development' measure and the results of Huisman (2006) do not differ significantly (p = .95). As a result, there is no statistical evidence that the results of the two studies differ.

Answer research question 4:

It has been questioned if the scores of the SOQ are higher (opposite for conflict) at the beginning of the NPD as in later phases of an NPD project. Thus, it has been questioned if the scores of the SOQ decrease, during the NPD project?

The compassion between the two measurements within in this study showed a small increase of the scores of the SOQ. This is in contrast with what was expected. Comparison with the results of Huisman (2006), indicates that the scores of the SOQ decrease during the NPD. The differences between the results of the scores of the two comparisons also have been statistical tested. For both comparisons, no statistical evidence could be found that the two comparisons differ.

Based on these results, it cannot be concluded that the scores of the SOQ decrease during the NPD.

4.2.4 Interpretation based on interviews about the norm

During the interviews, NPD project leaders clearly stated that the development activities change during the NPD, see Appendix X. The needed outcome of creativity changes from radical innovation into incremental innovation. Later in the NPD, there is more attention for time and budget. Another difference is the level of detail of the work. As a consequence the NPD project leaders only monitor the output of NPD team members instead of the process. The level of conflict may increase and the level of trust and openness may decrease, because projects become greater and more risk is taken as more time and budget is invested. Although the structures and practices slightly change, the organizational climate does not necessary have to change. For example freedom is on the one hand limited because the targets are set more tightly. On the other hand team members have more freedom within their domain. Although, there are clear changes of the

NPD, and therefore the organizational climate for creativity may change, no clear impression of the dimensions of the SOQ further in the NPD can be provided.

4.3 Multiple Methods: research question 5

Research question:

Q5: Are the results of the SOQ related to the results of the interviews?

In order to determine construct validity of the SOQ, the results of the SOQ have been compared with the results of semi-structured interviews related to the dimensions of the SOQ. Therefore, first the results of the interviews are introduced. Second, the relationship between the results of the SOQ and the coded interviews has been tested. Third, the averages of the results of the SOQ and the interviews have been compared.

Results:

4.3.1 Results of the coded interviews related to the organizational climate

Before the results of the coded interviews, related to the organizational climate, can be compared with the results of the SOQ, first the reliability of the coding process, has to be determined.

Scores have been assigned to answers of the interviews, by two independent judges of activities, which have been used for the Cohen's Kappa test[5].The agreement between the judges is moderate for both (k = 0,63).'Brainstorm', and (k= 0.49) 'Development' (see, Appendix XII).

In this study, the code results of the one judge have been used, since this was also the interviewer, and therefore has more understanding of the context of the answers.

4.3.2 Test of the relationship between SOQ and interviews

Per dimension of the SOQ, the relationship between the result of the SOQ, and the results of the interviews have been calculated. The results of project 1 and project 2, which have been measured twice, are only included once, because there is statistical dependence between the time points. The results of project 2, related to the measurement of brainstorm session have been used for the test, since there are no results of the interviews related to 'general' NPD activities. The results of project 1, related to 'general' development activities have been used, so in both measurements three projects have been included.

As a result the following data has been used:

- Measurement of the brainstorm session: Project 2, Project 3, and Project 4;
- Measurement of 'development' activities in the NPD: Project 1, Project 5, and project 6.

5 a remark has to be made that in the second interview with the project leader of project 2, the dimensions of the SOQ have not been considered

The results of the test for the relationship (Spearman's rho) is presented in table 4-2. A remark has to be made that the sample size is small. Furthermore, the results may be distorted because ranks are tied. Since, the answers of the interviews have been coded with a four point scale, fewer differences between the answers of the interviews can be observed. As a result many answers have the same rank. Therefore also the numbers of tied ranks, scores with the same rank, related to the scores of interviews have been included.

Table 4-2, Comparison of the results of the SOQ and the interviews

	Challenge & Involvement	Freedom	Trust & Ope-ness	Idea Time	Playfulness & Humor	Conflict	Idea Support	Debate	Risk Taking
Spearman's Rho (r_s) n = 6	0,54	0,85	0,73	0,03	0,51	0,71	0,53	0,5	0,51
Number of tied ranks	*5*	4	*5*	3	*6*	*5*	3	4	4

The 'relationship' between the results of the SOQ and the interviews are moderate to high (.5 to .85), except for the dimension *Idea Time,* where no relation was found (.03). Some dimensions have a high number of tied ranks. Therefore, also the results of an overview of the means of the SOQ and the interviews are presented.

4.3.3 An overview of the means of the SOQ and the interviews

In order to consider whether there are differences in the scores, the average results between the SOQ and the interview are graphically presented. The measurements of the organizational climate, related to the brainstorm session, and general development activities are presented in Figure 4-5 and Figure 4-6.

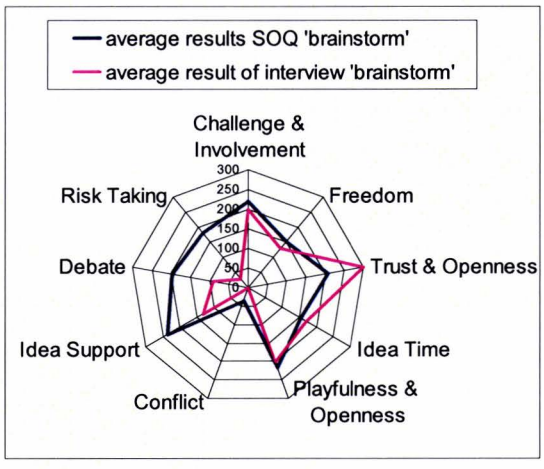

Figure 4-5, Overview of the results of the SOQ and the interviews related to the 'brainstorm' session.

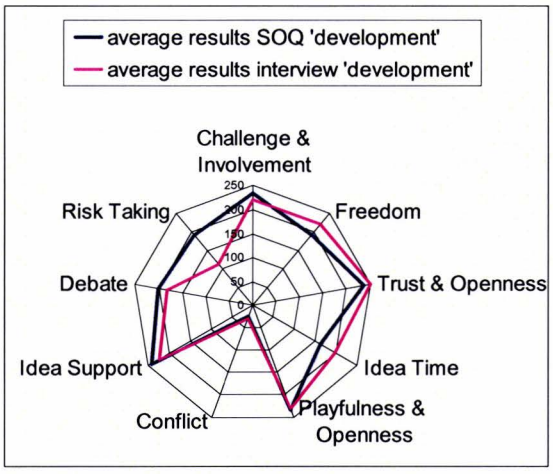

Figure 4-6, Overview of the results of the SOQ and the interviews, related to the 'development' NPD activities.

Figure 4-5 and Figure 4-6 show that the dimension *Risk Taking* is the only dimension which shows differences between the two measurement methods, in both figures. Furthermore, Figure 4-5 shows that also the scores on the dimensions *Trust & Openness, Idea Support, and Debate* differ.

In order to examine the discrepancies from both analyses of the four dimensions: *Idea Time*, *Risk Taking*, *Debate*, and *Trust & Openness*, the answers of the interviews have been interpreted. Since the SOQ is a

commercial instrument, and scores are only presented per dimension and not on item level, the items of the SOQ cannot be considered.

4.3.4. Interpretation based on interviews

Based on interviews, presented in Appendix XII, interpretation of the results is given per dimension:

- *Idea Time*: During the brainstorm session, on the one hand idea time was limited to study more details, but on the other hand, it was long enough to generate enough relevant new ideas. In the measurement related to general NPD activities, differences in idea time could be observed between the projects. Project 1, indicates that there was considerable idea time, while in project 6 activities are limited by idea time.
- *Risk Taking*: All considered NPD projects, besides project 6, state that there is practically no risk;
- *Debate*: In general, during the brainstorm activities attendants were not supposed to debate about new ideas, because new ideas had to be proposed. However, in project 2 a debate was necessary in order to understand the objectives of the brainstorm the instructions. Part of the attendants first questioned the objectives
- *Trust & Openness*: In all considered NPD projects, Trust and Openness was estimated as very high.

Based on the Table 4-2, Figure 4-5 & 4-6, and the description presented above, per dimension, construct validity can be considered:

- *Idea Time*: Table 4-2 shows that there is no relationship between the results of the SOQ and the interviews in the dimension *Idea Time*. Based on further study of the answers of the interviews, the construct validity of *Idea Time* during the brainstorm session can be questioned. It appears that during the brainstorm session determining *Idea Time*, can be ambiguous, because it is not clear what is considered as an idea. A creative idea will have to be further developed to some extent (Levitt, 2002).
- *Risk Taking*: Although in Table 4-2, a relationship is presented, construct validity is examined based on the results of Figure 4-5, & 4-6 and the interpretation of the interviews. It appears to be practically no risk, and a as consequence no risk can be taken. Therefore the dimension seems inappropriate.
- *Debate*: The only discrepancy of the results is presented in Figure 4-5. However, since debates can be present at the brainstorm session, the construct validity of the dimension *Debate*, is regarded as valid. The high scores of the SOQ may show that there are debates between and during some of the activities. Attendants cannot only generate ideas during a brainstorm session of a day. Perhaps, in the interviews, only the 'pure' idea generation activities are taken in account, instead of the whole session.
- *Trust & Openness*: The only discrepancy of the results is presented in Figure 4-5. Since, the scores of the SOQ are also high (200), the construct validity of the dimension *Trust & Openness* appears to be valid. Perhaps, project leaders give social desirable answers. It is not likely, that every member trusts each other and is open, just because they attend in a brainstorm session.

Answer research question 5:
Is there a relation between the SOQ and the coded interviews? Can the construct validity be confirmed?
Considering the data collected to answer research question 5 the following can be concluded:
All dimensions except for the dimensions *Idea Time*, and *Risk Taking,* can be regarded as valid.

4.4 Additional results of the study

In this study also two additional results have been found, which may be relevant for future research. Additional result of this study consists of two parts. First, an overview of the creative outcomes is presented. Second, the results of SOQ are compared with a benchmark score of Isaksen et al., (2006).

Overview of the creative outcomes

The success criteria of this study of the organizational climate for creativity consist of the following creative outcome; raw ideas, concepts, and white cards, and idea support of the project principle or customer.

The creative outcomes: raw ideas, concepts and white cards:
The creative outcomes: raw ideas, concepts and white cards are mainly related to the OCP. Therefore only the measurements of organizational climate of the projects during the brainstorm session are considered, see table 4-3.

Table 4-3, The creative outcome of the OCP.

	Project 1	Project 2	Project 3	Project 4
Ideas	± 100	70	± 100	19
Concepts	18	20	14	6
White Cards	10-12	5	6	-

Project 5 an project 6 are not included in table 4-1, they have not been measured during an idea generation session.

Idea support of the project principle or customer:
Support of the principle: consist of the continuation of the project, and of compliments of the results of the project, like demonstrators. Support of the NPD projects, has been determined based on interviews. See Appendix XIII. The results are presented below:

- Project 1 received positive responses on their demonstrators;
- Project 2: the customer was very satisfied. At the moment, there is an opportunity that the project will be continued;
- Project 3: has been cancelled, because of political reasons;
- Project 4: has been delayed. The reason is unknown;
- Project 5: the project was approved to continue the activities of the project. Currently, feasibility of the design is tested;
- Project 6: the project was approved to continue. At the moment, risks in the design are further decreased.

All projects, except project 3 and project 4, are approved to continue.

Results of SOQ are compared with a benchmark score

In Figure 4-7 and Figure 4-8 the results of the measurements related to the brainstorm session and the general development activities are presented next to the Benchmark SOQ results 'Innovative' (Isaksen et al., 2006[b]).

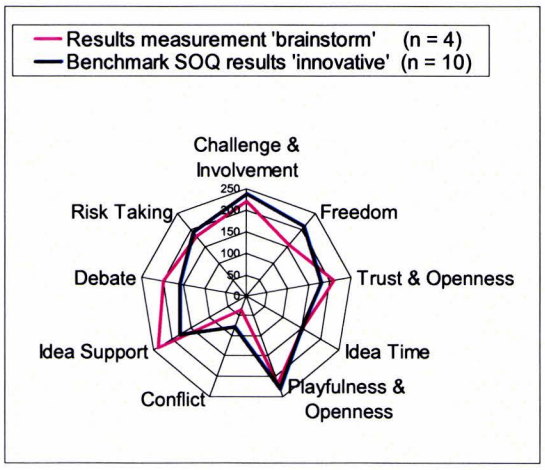

Figure 4-7, Overview of the results of the SOQ 'Brainstorm' measurement with the results of Benchmark SOQ results 'Innovative'

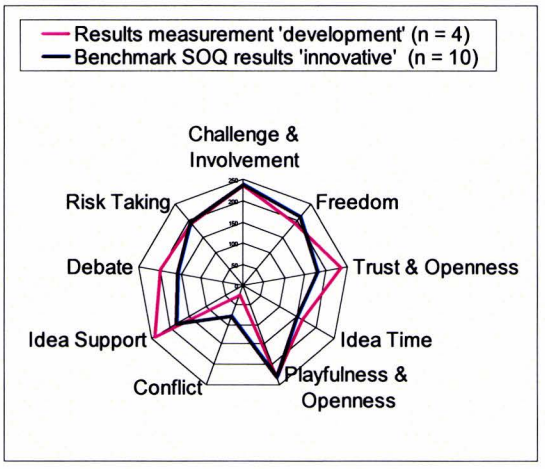

Figure 4-8, Overview of the results of the SOQ 'development' measurement with the results of Benchmark SOQ results 'Innovative'

Figure 4-7, show considerable differences in four dimensions. The results of this study of the organizational climate related to brainstorm sessions, shows higher scores on the dimensions *Trust & Openness,* (lower score) *Conflict, Idea Support,* and *Debate.* The dimension *Freedom* is lower, than of the benchmark results. Thus, besides the dimension *freedom*, can be concluded that the scores on the SOQ is higher than of the Benchmark results of Isaksen.et la., (2006)

The results of the SOQ presented in Figure 4-8 are considerable different on the dimension *Trust & Openness* , (lower score) *Conflict* and *Idea Support*. Furthermore, the dimension *Debate* is slightly different. Overall, the scores of the SOQ are higher than of the of the Benchmark results of Isaksen et al., (2006).

5 Discussion

First the major findings of this study are presented. Second, the validity of this study is discussed. Third, suggestions for future research and recommendations for practical use of the SOQ are proposed.

5.1 Major findings

The major findings have been divided into the three parts of the study, which are: teams, the development of a norm, and the use of multiple methods. Furthermore, a general finding, concerning the design of a longitudinal study has been included.

Teams

Groups of employees who work on an NPD project come in different sizes. Such groups cannot directly be considered to be a team, because this depends on team size, and task interdependency. Furthermore partial inclusion has to be considered. Based on team size, and task interdependency the members of, one project, project 1, could not be regarded as a team, because one member did most of the work on his own. Furthermore, it was noted, that the number of employees related to an NPD project may grow during the NPD. Note, that the only project which has been positioned in the design phase, project 6, has a team size of 16, consisting of members of different departments. Furthermore, growth of team size related to an NPD project is also observed by Steven, & Burley (1997). Therefore, identifying an NPD team as research unit may become inappropriate in later phases of the NPD process.

Another aspect concerning team as measurement level for the organizational climate, is the relation with the rest of the organization. Partial inclusion has to be considered when determining if perceptions of team members can be influenced because they also work outside the project. For all considered projects, team members worked over 50% of the time on other projects. It is possible that they are being influenced by recurring patterns of behavior, attitudes, and feelings that characterize life in outside the considered NPD project. As a result, it is not certain if the perceptions of the organizational climate for creativity of NPD team members are really only related to the considered NPD project. Furthermore, NPD team members can also be influenced during activities within an NPD project. Often NPD team members have to communicate with people outside the NPD team, in order to execute their activities, and may again be affected by outside influences.

Development of a norm:

Based on phase models of the NPD, it could be assumed that SOQ scores may be lower as the project progresses. This decrease in the climate for creativity would be caused by a lower need for creativity; in later phases, decision space becomes more restricted, because more concrete actions need to be taken towards production, and considerations related to efficiency may also limit the openness to new ideas. Therefore a possible decrease of the scores of the SOQ during the NPD has been studied. Such a decrease could indicate that certain SOQ scores are better suited at the different phases of the NPD

In order to study this potential decrease, the results of this study have been compared at two points in time, and with the results of Huisman (2006). The compassion between the two measurements within in this study showed a small increase of the scores of the SOQ. This is in contrast with what was expected. Comparison with the results of Huisman (2006), indicates that the scores of the SOQ decrease during the NPD. Both studies measured the organizational climate for creativity in NPD teams within Philips, so they are expected to have similar characteristics. In contrast to this study, which measured only NPD projects at the beginning of the NPD, the results of Huisman (2006) are related to NPD projects throughout the NPD.

Since the scores of the SOQ are higher in this study, this comparison indicates that the scores of the NPD will decrease during the NPD.
The differences between the results of the scores of the two comparisons also have been statistical tested. For both comparisons, no statistical evidence could be found that the two comparisons differ.

Interviews, especially project 5 & project 6, indicate that in later phases of the NPD, developers have to find solutions within 'control quality' requirements and within time and budget, which may limit their creativity in an NPD team. On the other hand, they also indicate that employees, within their task become more independent.

Although based on the findings of this study, there is no clear indication that the organizational climate will change during the NPD, still this idea is not rejected . Therefore three explanations are provided.

1) *Statistical power:* since the sample size is small, there was too little statistical power to conclude that the scores of the SOQ are higher as in the study of Huisman (2006).
2) *Measurement point:* All NPD projects, except project 5 and 6, have been studied in the FFE and the beginning of the concept phase. Perhaps more differences on the scores of the SOQ can be observed in the design phase, when the scale of the NPD project increases. For example project 6, which is positioned in the design phase, has relations with different departments. It is striking to see in Figure 4-2, that the results of the SOQ of project 6, are lower than in the other NPD projects.
3) *Literature:* Activities of the NPD will change, which should cause the organizational climate to change. The literature indicates that also the focus shifts during the NPD. (Miron, Erez, & Naveh, 2004; Naveh, 2005, Isaken & Tidd, 2006).

As a consequence, a norm of SOQ scores at different phases in the NPD, could still be necessary to interpret the results of the SOQ.

In meanwhile, it is not clear how the results of the SOQ should be interpreted. High scores of the SOQ are not always better since there is no standard, or perfect, score on the SOQ (Isaksen & Lauer, 1999; Isaksen et al., 2006). As such a 'maximum' score does not necessary indicate 'the best' outcome for an organization (Isaksen, Lauer, 1999). However, in the context of NPD, interpreting the results of the SOQ is even more difficult, because development activities change during the NPD. Therefore, extra attention has to be paid, to the specific NPD project, when interpreting the results of the SOQ.

Multiple methods

The relation between the results of the SOQ and the coded interviews has been *tested*, in order to determine construct validity of the SOQ. No relation was found for the dimension *Idea Time*. Further study of the interviews provided a plausible explanation. It is difficult to determine what idea time is, because this is related to on the hand generation new ideas, and on the other hand to further developing of these ideas. During a brainstorm session there is only time for generating new ideas. But, employees may expect that a creative idea will have to be further developed to some extent (Levitt, 2002).
Furthermore, the results of the coded interviews have been *compared* with the SOQ. The differences were small for most of the dimensions. However, in the comparison of the first measurement, the dimension *Risk Taking, Debate,* and *trust & Openess* differed strongly. Interpretation of the interviews provided a plausible explanation. Since during a brainstorm session there is supposed to be no risk, the question how is dealt with risk is not applicable. At the beginning of the NPD, little investments have been made, and as result less risk can be taken. Therefore, it appears that the questions related to Risk Taking are not appropriate at the beginning of these considered NPD projects.

The deviation of the dimensions *Debate,* and *trust & Openess,* respectively could be explained the presence of debates in and between the activities during a brainstorm session, and by social desirable answers of the project leaders during the interviews. When the interviews are studied in more detail, the presence of debates could not be excluded. The dimension *Trust & Openness* needs not to score maximum.
In summary, the construct validity of all dimensions except Idea Time, and Risk Taking could be confirmed.

General finding: longitudinal study
In contrast to existing literature on NPD (Andreasen & Hein, 1987; Cooper, 1990; Ulrich & Eppinger, 2006) in this study clear and detailed guidelines are presented to position activities in the NPD. These presented guidelines, can be regarded as a contribution to the 'Stargate Model', because they also consider the FFE. Based on these guidelines, it should be less difficult to position activities within the NPD.
Executing a longitudinal study is difficult because it is often not clear which status an activity has. For example the development of a prototype can take place on different places within the NPD. It is hard to position an activity within the NPD. As a result it is possible that different researchers position an activity in another place of the NPD. The guidelines, presented in this study, could provide more additional structure for positioning activities within the NPD.

5.2 Validity

Internal validity:
As a validity study, this study lacks statistical power because only a limited number of projects have been considered. However, because also interviews have been taken into consideration, findings about the validity of the SOQ can still be presented. Nonetheless, more projects should be included to increase statistical power.

External validity
In order to generalize the results of this study, first the specific characteristic of this study have to be considered. The research has taken place in the Netherlands, within Philips, and in NPD teams. Furthermore, some of the projects have made use of the OCP. However, in this study a distinction has been made between the measurement of the organizational climate for creativity taken at the brainstorm session as part of the OCP, and at 'general' NPD development activities. As a result, the findings may be meaningful to NPD teams within a brainstorm session and to NPD teams within a 'general' NPD activity. However, NPD projects come in all sorts and sizes and therefore extra attention should be paid when considering these findings. For example, it is stated that the considered NPD projects have little risk at the beginning of the NPD. But, this needs not to be the case for an 'incubator', an entrepreneurial NPD project, in which a developer is fully dedicated to the project.

Statistical solution validity
Since the sample size was limited, non-parametric tests (chi-square test, Spearman's rho test) have been used. As a result, additional cases may change and/ or stabilize the outcome. Additional data is necessary to increase reliability of the results.

Construct validity
Although, the number of considered NPD projects, and the team size of the SOQ samples was small, the validity of this study, was enhanced by interviews.

5.3 Future research & Recommendations

Future research:
Suggestions for future research are presented related to general understanding of the SOQ, NPD team, and the development of the norm.

General understanding of the SOQ: Future research is necessary to investigate the relation between the scores of the SOQ, and the NPD activities within the NPD project. This may also contribute to determining construct validity. Although the dimensions of the SOQ, seem pragmatic and easy to understand at first glance(Mathisen and Einarsen, 2004), they also can be ambiguous. Take for example the dimension *Freedom* during a brainstorm session. Attendants of the brainstorm session may feel free to present ideas. But at the same time they are not supposed to change the structure of the brainstorm session. Studying the relation between the organizational climate and the NPD project organization itself can contribute to the understanding of the dimensions of the SOQ. Therefore the relation between the factors presented in the 'model for organizational change' of Isaksen et al., (2006) and the organizational climate, can be used as a starting point.

Teams: The considered NPD teams all had partial inclusiveness. As a result NPD team members can be influenced the organizational climate for creativity, outside the considered NPD project. Future research is necessary to determine to what extent NPD team members are influenced during contact with other members of the organization. Therefore two suggestions are provided. First, as proposed above, the relationship between the organizational climate and the organization should be further studied. In addition to the suggestion presented above, also the environment outside NPD project can be studied. Second, the organizational climate of an NPD team and of a department can be measured, in order to compare the results. Since often a team consists of members of the same department, it is likely that there exists an overlap between the organizational climate of the department and the NPD project. If this difference between the scores of the SOQ would be small, this would mean that members of the two environments influence each other.

Future research should account for termination of NPD projects. Of the eight NPD projects considered in this study, one project was terminated and one project was delayed. Since NPD projects are related to uncertainty (Steven & Burley, 1997), it can be expected that in future research a considerable number of projects will stop earlier. Therefore, should besides, a commercial success, also the number of phases in the NPD has to be taken into account in further research (see, Huisman, 2006).

Development of a norm: In this study, no clear indication has been found that the results of the SOQ decrease during the NPD. However, plausible explanations have been presented, suggesting that the scores of the SOQ will decrease further in the NPD. Therefore, more research is necessary to determine whether the scores of the SOQ decrease during the NPD. Especially, scores of the SOQ of considered NPD teams further in the NPD project have to be included.

Recommendations for practical use
To conclude, the SOQ can contribute to understanding of the organization. Understanding the organizational climate may contribute to developing and implementation of organizational improvement initiatives. However, keep in mind that it is difficult to interpret the scores of the dimensions, since there are only rough guidelines as norm, and the construct validity of the dimensions *Idea Time* and *Risk Taking* can be questioned at the beginning of the NPD.

List of Tables

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Appendix I: Organizational Culture and Organizational Climate

Table 6-1, Contrasting Organizational Culture and Climate Research perspectives

Differences	Culture Literature	Climate literature
Epistemology	Contextualized and idiographic	Comparative & nomothetic
Point of view	Emic (native point of view	Etic (researcher's viewpoint
Methodology	Qualitative field observation	Quantitative survey data
Level of analysis	Underlying values and assumptions	Surface-level manifestations
Temporal orientation	Historical evaluation	Ahistorical snapshot
Theoretical Foundations	Social construction; critical theory	Lewienian field theory
Discipline	Sociology & anthropology	Psychology

Source Denison, 1996

Table 6-2, Contrasting Organizational Culture and Climate Research perspectives

Area of convergence	Examples of convergence
Definition of the phenomenon	Both focus on the internal social psychological environment as a holistic, collectively defined social context
Central theoretical issues	Shared dilemma; context is created by interaction, but context determines interaction
Content and substance	Definition of domain varies greatly by individual theorist Dynamics between the whole and the part; Multiple layers of analysis Dimension vs. holistic analysis Subcultures vs. unitary culture
Epistemology & methods	Recent emergence of quantitative culture studies and qualitative climate studies
Theoretical foundations	Roots of culture research are in social constructionism Roots of climate research are in Lewinian field theory Many recent studies have crossed or combined these traditions

Source Denison,1996

Appendix II: The'Stargate'model

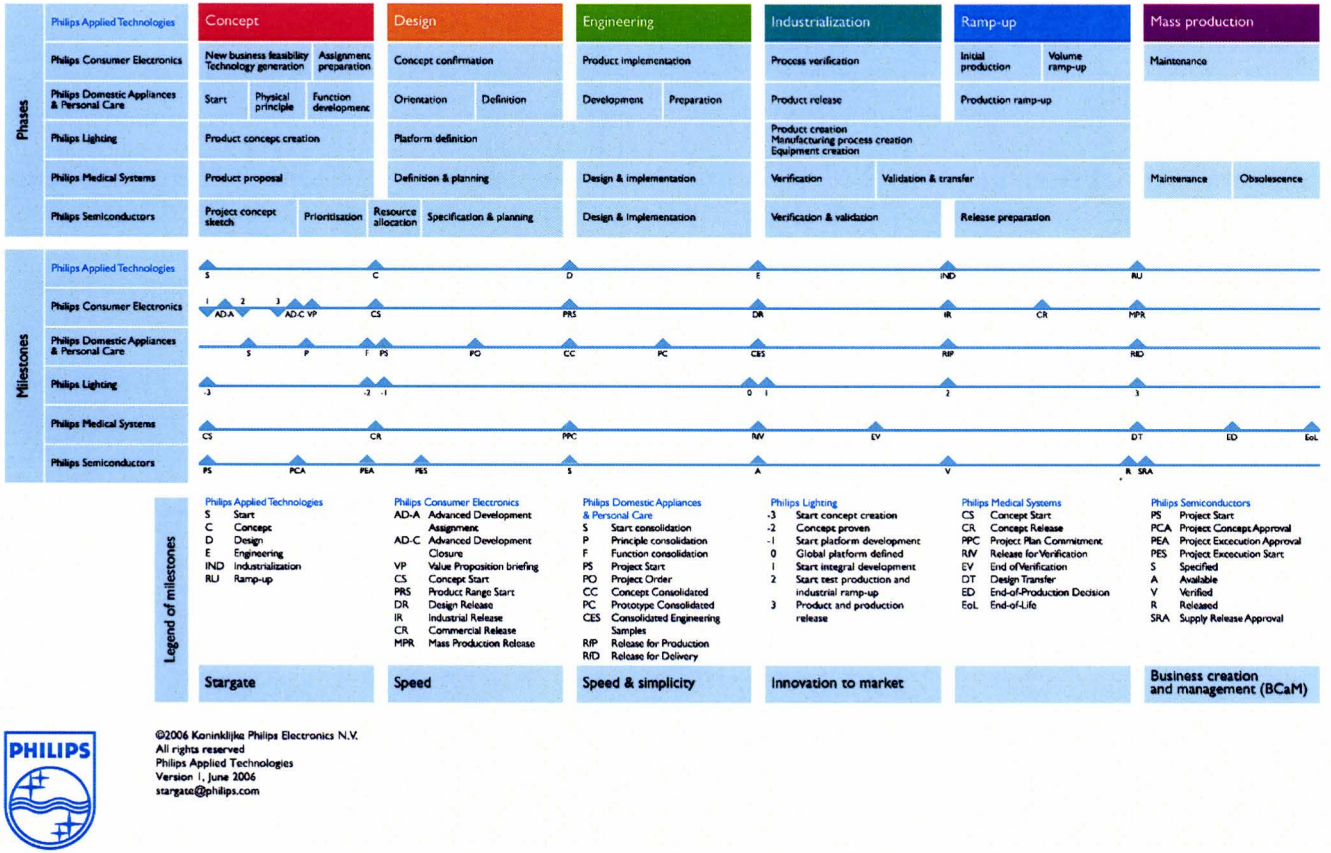

Figure 6-1:, The 'Stargate' model.

Appendix III: Business Creation Process

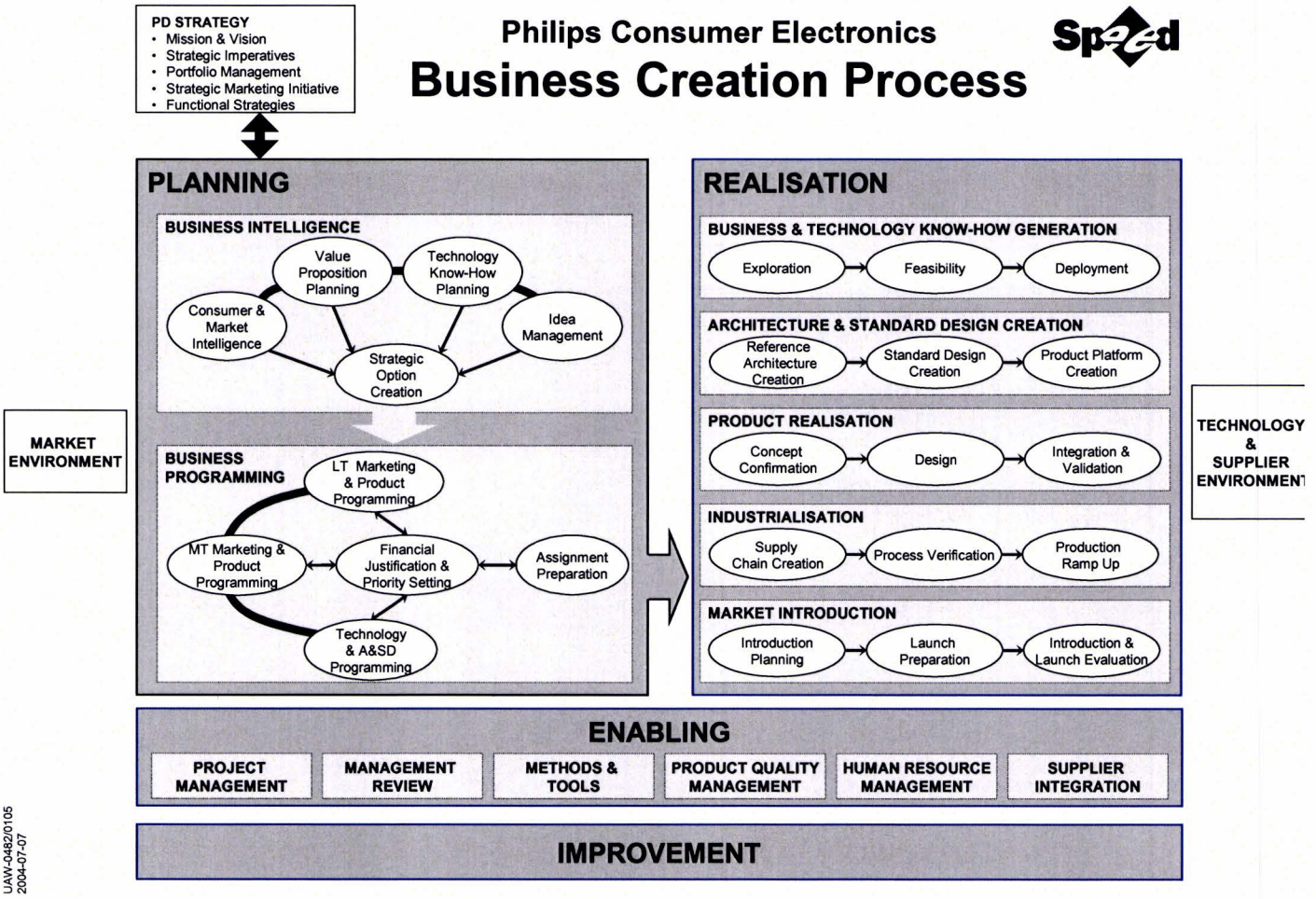

Figure 6-2, The 'SPEED' Model

Appendix IV: Questions of the semi-structured interview of the two measurements

Questions first interview

Relation of the person between the brainstorm session and the NPD process?

1. What is your role in the entire NPD process?
2. Where do you place this brainstorm session in the context of the NPD process?
3. What is in your opinion the importance of this brainstorm sessions compared to other NPD activities that have more or less taken place in the same time period?
4. What other activities can you quickly think of that have taken place? (perhaps who are involved in those activities)
5. How important was creativity in this part of the NPD process? (Ask for example)

Presence of the nine dimensions of the SOQ-questionnaire!

[Challenge & Involvement, Freedom, Idea Support, Trust & Openness, Playfulness & Humor, Debates, Conflicts, Risk Taking and Idea Time.]

6. How do you regard the presence of this dimension during the meeting?
7. Do you think that the level of this dimension could have been higher? (Except conflict)
8. Do you think that the level of this dimension can be too high?
9. How is this in the other activities surrounding the brainstorm session, briefly?

(Possible) differences with other experiences of a brainstorm session?

10. Have you attended a brainstorm session before?
11. What differences have you noticed in general?

Questions second interview

Relation of the person between the brainstorm session and the NPD process?

1. What is your role in the entire NPD process?
2. What other activities can you quickly think of that have taken place? (perhaps who are involved in those activities)
3. How important was creativity in this part of the NPD process? (Ask for example)

Questions related to teams

3 How many employees are really working on the project?

4 Do the team members need each other in order to achieve their objectives?

5 How much percent of the team are you working in this project? How much percent of time do the other members work on other projects?

Presence of the nine dimensions of the SOQ-questionnaire!

[Challenge & Involvement, Freedom, Idea Support, Trust & Openness, Playfulness & Humor, Debates, Conflicts, Risk Taking and Idea Time.]

6 How do you regard the presence of this dimension during the activities?

Appendix V: Instruction for the coding of the interviews

In order to code the interviews in relation to the nine dimensions of the SOQ, the following instruction has been used.

Instructions

Diffinition of the nine dimensions of the SOQ

The definitions of the nine dimensions of the SOQ are presented in Table 2-1.

Scale

Initially a 4-point scale should be used; in which

0 = the level of the dimension is zero, connected to 'Not at all applicable'.

\+ = the level of the dimension is moderate, connected to 'Applicable to some extent'.

++ = the level of the dimension is strong, connected to 'Fairly applicable'.

+++ = the level of the dimension is very strong, connected to 'Applicable to a high degree'.

However it is also possible to assign half scores: **0/ +; +/++; ++/ +++.**

Assign scores

A score should be assigned to the extent that an answer in the interview fits with the definition of a dimension of the SOQ as presented on the following page.

Assign more extreme points (for example: **0** or +++) when the answer fits the following condition:

- Exuberant answer (uitbundig antwoord)
- Surely answer (stellig antwoord)

Support for your score: use brackets

In order to support your decision, why a specific score is assigned, a part of the answer should be selected. This could be placed within brackets. Selecting text has two advantages. This makes it easier to control the coding process.

Appendix VI: Task interdependence

Project 1 First: Interview met project leader
RRR Nu, worden de prototypes nog gemaakt, wie gaat dat doen? Een nieuw team, of? Dat gaat *persoon* voor een groot deel zelf uitvoeren. Hij kan alles zelf maken omdat hij zowel een designer is als een elektronicus. En als hij de grenzen bereikt dan zoeken we iemand die kan helpen.

Project 1 Second: Interview met Project leader
Maar idea support, eigenlijk heeft persoon het uitvoerende werk helemaal zelf gedaan, wat jij zegt. Ze hebben dus niet tegen jouw gezegd van wat vindt jij ervan. Dit is een goed idee, maar dit zou nog beter kunnen of zo. BBB Nee, dat is eigenlijk heel weinig gebeurd.

Project 2 Interview met project leader
Maar de vier die wij zelf doen, die zijn dusdanig verwant dat je daar heel veel overlap tussen hebt. En ja goed, je moet ook dingen niet dubbel doen he. Er zijn ook acties bijvoorbeeld van dit concept, vraag jij dit bij die leverancier, en van hetzelfde concept vraag jij dat, bij die leverancier. Dan moet je uiteindelijk wel dezelfde vragen gaan stellen. Anders dan werk je helemaal naast mekaar heen. Dat gaat goed.

project 3 Interview met project leader
De andere stap die is begint woensdag waarbij de rest van die brainstorm dus dat zijn die 70 ideeën die nog niet uitgewerkt zijn plus een aantal van die wel al uitgewerkte modellen maar die opzij waren geschoven, omdat we het nog niet zagen. Daar ga ik nu nog eens keer met iemand van Philips Design nog eens een keer doorheen. Om te kijken van wat is dit nu echt en kunnen we hier nou even iets bij verzinnen en dat ook in een soort tekening op papier hebben. Maar juist weer iets verder de diepte in om te kijken van wat is het nu echt. Dat is een stap. Dan willen we de uitkomst daaruit gebruiken voor een soort verrijkingssessie waarbij we dan met een kleinere groep naar kijken. AAA Van die 70 overgebleven ideeën.

project 4 Interview project leader
This project consist out of a brainstorm session and a brief summation of the results. It is evident that during the brainstorm session there was task dependence and during and the summation activity was very limited to the development of a small presentation.

Hoeveel bladzijden is, al zegt het niet zoveel, maar toch. BBB Ja een stuk of tien. Het is gewoon een powerpoint. En dat is ook zo afgesproken. Er staat nog weinig of niets in van kosten, zoveel gaat het kosten. Dat is gewoon niet mogelijk in zo'n korte

Project 5 Interview met project leader
AAA Ja het is natuurlijk niet voor niets gekozen. Iedereen heeft zijn taak, dus ik zorg voor de klant contacten de specificaties en de requirements, er zijn mensen die het theoretische doen, dus het thermische model van zo moet het eruit zien. Er zijn mensen die de tekening maken. Mensen die het realiseren. Je hebt mensen die de onderdelen inkopen. AAA En die moeten allemaal continu met elkaar praten om te weten wat ze doen. BBB ja. AAA Helder. BBB Daar zijn we ook één keer in de week ongeveer bij een projectteam meeting, om juist alle rollen bij elkaar te knopen.

Project 5: Interview met Developer
Ik denk dat *persoon* daar bijna 80% van zijn tijd nu in zit. En ik zit daar heel weinig in. Ik denk tussen de vijf en de tien procent.Hij heeft dus hulp van de constateur als er dingen getekend moeten worden of zo, maar die fase is al afgerond en dan heeft hij ook nog van mensen uit de werkplaats om gewoon te helpen bij de proeven en hij heeft hulp van iemand van technologie en die helpt hem ook bij het doen van de metingen. Dus wat meer op technologisch gebied.

Project 6: Interview met Project Leader

BBB ik zeg maar, alleen maar de interactie tussen product design en proceskeuze is inherent in de productontwikkelingsfase en in procesontwikkelingsfase. Dat betekent dat het proces dat je bekijkt en die je moet ontwikkelen om een product te bouwen zijn afhankelijk van het design

En dit soort van interactie hebben wij op zich de hele tijd in de ontwikkelingsfase. Die nu ook actief is nog steeds. AAA Daarom moeten de vijf leden continu met elkaar overleggen van wat zullen we doen. BBB Ja precies. Samen ook

Appendix VII: Partial inclusion

First measurement Partial Inclusion

Project 1: Interview met Project leader
AAA Nu, worden de prototypes nog gemaakt, wie gaat dat doen? Een nieuw team, of? Dat gaat *persoon* voor een groot deel zelf uitvoeren. Hij kan alles zelf maken omdat hij zowel een designer is als een elektronicus. En als hij de grenzen bereikt dan zoeken we iemand die kan helpen. Maar *persoon* gaat dat voorlopig zelf uitvoeren

Project 2: Interview met Project leader
En daarnaast hebben wij nog een soort tegen-afdeling in Hong Kong. En waarschijnlijk zullen zij ook nog wat dingen gaan uitwerken. Maar dat is puur vanwege capaciteit. Dat we zelf niet genoeg tijd beschikbaar hebben om het allemaal zelf te doen.

Project 3: Interview met Project leader
AAA Er zijn ongeveer vijf zes man die het project goed volgen en er ook regelmatig contact over hebben. En van die vijf zes man zijn er één of twee beslissers die geld hebben en die uiteindelijk. en dan praat je over technologie en innovation managers. En dan zijn er een man of drie vier die waarmee we echt inhoudelijk bezig zijn. Ik zeg dus dat het team dat er mee bezig dat dat echt maar vier mensen zijn of zo.

Het handige van deze organisatie is dat je maar 40 uur in je SAP kunt invullen dus dar hoef je je maar voor te verantwoorden en iedereen werkt meer dan 40 uur hier. Je kan nogal makkelijk iets tussendoor doen. Dat is wat nu gebeurt. Maar ik kan voor mezelf geen week hier fulltime aan besteden want dan hebben we een project nodig. Een middagje hier, een paar uur daar. Dat gaat redelijk goed. Als ik dat nu zou moeten afschatten de weken na de brainstorm, zo'n 10% van de mijn tijd, ene halve dag. Maar goed met het hele doel dat je uiteindelijk hier een serieus project uit krijgt. dat je gewoon drie vier mensen hier fulltime aan hebt werken. RRR Die vrijheid is er nu wel maar die heeft met tijd te maken en dat is je eigen tijd? LLL Nou we worden geacht een gedeelte van onze tijd in iets te stoppen dat hier GEIN heet, GEnerating INnovations dat is typisch iets als technology push achtige dingen uit te werken. En dan zeg je tegen je baas ik gebruik wat GEIN tijd en dan zegt hij dat is prima. RRR Maar doe je het dan eigenlijk in je vrije tijd? BBB Nee, die 40 uur is als je snel even iets nodig heb, hier heb je een project nummer voor.. Bijvoorbeeld op woensdag middag zit ik een halve dag met iemand van design en dat is duidelijk officiële tijd van CDL voor dit soort activiteiten.

Project 4: Interview met Project leader
Het is echt een kortdurend geheel geweest, er zijn twee sessie van laten we zeggen vier uur geweest en dat is zo ongeveer de tijd besteed die we gehad hebben. AAA Er is van ten voren geen voorbereiding geweest van informatie die relevant is?

Second measurement Partial Inclusion

Project 1: Interview met Project leader
Het project ligt nu een beetje stil omdat ontwerper persoon, momenteel vol bezig is met 'next simplicity'. Dit is een tentoonstelling in Londen gericht op innovatie en design. Hier is hij nu 100% mee bezig en dit duurt tot eind september. Dus tot die tijd ligt het project even stil.
(Dit gesprek is opgemaakt uit telefoongesprek.)

Project 2: Interview met Project leader
RRR Wie zijn er op moment allemaal bij betrokken? Direct binnen deze groep ben ik, *persoon1*, *persoon2*, *persoon* 3, vanuit AppTech persoon en persoon, dus dat zijn er vijf. Vijf mensen direct en ja goed dan lopen

er dus nog allerlei discussies zo indirect kan ik dat moeilijk inschatten omdat dat allemaal via de teamleden loopt. Het kernteam is vijf
Het zijn er trouwens zes. Er is namelijk vorige week een collega uit China hier geweest uit Hong Kong en die zal ook mee gaan helpen met het uitwerken van een aantal concepten.
Ik schat, ik denk de overige drie, één dag in de week, één a twee dagen in de week, en ik zelf iets meer. Ook minder dan ik zou willen. Ik weet niet, drie a vier dagen zou ik echt wel aan moeten werken.

Project 5: Interview met Project leader:
BBB Ik ben 1 dag in de week en andere wisselt. Er zijn er drie de helft van de tijd mee bezig en drie een dag in de week. Zoiets ongeveer. AAA En de systeemarchitect, hoeveel is die er mee bezig? BBB Hij als opdrachtgever? AAA Veel minder. BBB Ja, veel minder.

Project 5: Interview met Developer:
BBB *persoon*. Ik denk dat *persoon* daar bijna 80% van zijn tijd nu in zit. En ik zit daar heel weinig in. Ik denk tussen de vijf en de tien procent. AAA En Mart werkt niet samen met andere mensen, die is er helemaal alleen mee bezig eigenlijk, behalve contact met jouw dan. BBB Hij heeft dus hulp van de constateur als er dingen getekend moeten worden of zo, maar die fase is al afgerond en dan heeft hij ook nog van mensen uit de werkplaats om gewoon te helpen bij de proeven en hij heeft hulp van iemand van technologie en die helpt hem ook bij het doen van de metingen. Dus wat meer op technologisch gebied.

BBB Maar dat zie je vaak in ons soort projecten, dat er bijwijze van spreken een soort core team hebt, die eigenlijk van begin tot het einde bij het project betrokken is. En dan zie je dat in elke fase er mensen komen aanfladderen en die doen wat en dan zijn ze weer weg.

Project 6: Interview met Project leader
AAA En met hoeveel man werken jullie in # eraan? BBB In #, zijn wij met vijf personen, die samen niet met 100%, maar met ongeveer 30% capaciteit aan #
Aan de éne kant, dat is de ontwikkelingsactiviteit van het module totaal, en verder hebben we ook nog de coöperaties met de verschillende partners, waarbij betalen voor een bepaalde capaciteit aan SLE, maar ook aan # in de vorm van Business Agreed Project. Waarbij wij ook voor de ontwikkelingsactiviteiten betalen. En een andere partner, de derde partner, is #. # in de USA, en die zijn verantwoordelijk voor de LED's, die wij gebruiken

BBB Met honderd, procent. Die doet de busines development richting marketing etc. Een andere partner kun je ook nog noemen, is het # in #. Die zitten buiten de ontwikkelingsafdeling en voor applicatie aspecten van onze module ook bezig is en in het project meewerkt.
Wij gebruiken daar, dat is misschien vergelijkbaar met het lab dat we hier ook binnen # hebben zitten voor algemene verlichting applicaties, wij hebben dat speciaal voor #. En dat is een organisatie die een beetje apart staat, die niet binnen onze ontwikkelingsafdeling, maar die ook bijdraagt aan # met een bepaalde hoeveelheid manpower. En daar vooral naar applications-aspecten te kijken. Wat zijn de randvoorwaarden voor een stoplicht? Functie bijvoorbeeld, als je nu eens naar de wetgeving in de US kijkt. En dit soort van randvoorwaarde.

Uhmm, BBB En dan laatst not least, hebben wij ook nog een coöperatie binnen dit project, met de voorontwikkeling hier, in Eindhoven, binnen #, # van #. En hier zit ook een bepaalde ondersteuning van manpower, die binnen het # ook mee doet, in verschillende richtingen. De richting gaat productontwikkeling, constructies, thermische berekeningen. Of metingen ook soms. Maar ook, metingen van licht, en berekeningen van verschillende reflectorconcepten, die bijvoorbeeld geschikt zijn voor onze applicaties

HHH Ik heb hier een overzicht natuurlijk op papier. Die heb ik nu niet, maar totaal, volgens mij zijn wij dit jaar rond 3,5 FTE binnen #, die ook voor # bezig zijn. Dus in totaal hebben wij misschien in 2006 iets van 12 en 15 personen, maar die niet allemaal fulltime hieraan werken, natuurlijk, maar als wij richting FTE's kijken zijn dat denk ik iets van 7 tot 8 FTE's misschien, als je alles samen berekend. Bij SLE, bij #, bij #, binnen #. # en zo ver.

Appendix VIII: Total results of the SOQ per project

Table 6-3, Total results of the SOQ, related to the measurement of the brainstorm session

Project Dimension	Project 1	Project 2	Project 3	Project 4
Challenge & Involvement	216	233	229	205
Freedom	145	188	161	122
Trust	186	221	227	193
Idea Time	146	160	175	128
Playfulness & Humor	238	210	211	211
Conflict	30	37	50	22
Idea Support	247	237	260	213
Debate	176	202	189	222
Risk Taking	203	194	157	173

Table 6-4, Total results of the SOQ, related to 'general' NPD development activities

Project Dimension	Project 1	Project 2	Project 5	Project 6
Challenge & Involvement	210	249	255	224
Freedom	217	187	190	164
Trust	260	232	260	191
Idea Time	150	197	183	119
Playfulness & Humor	261	240	245	176
Conflict	6	23	19	57
Idea Support	240	256	260	217
Debate	167	223	224	183
Risk Taking	153	220	211	174

Appendix IX: Comparison between average results of two studies

Table 6-5, Average results of the SOQ of 'brainstorm ', and 'development'

	Results brainstorm measurement	Results measurement 'development'	Difference
Challenge & Involvement	220,75	234,5	-13,75
Freedom	154	189,5	-35,5
Trust & Openness	206,75	235,75	-29
Idea Time	152,25	162,25	-10
Playfulness & Humor	217,5	230,5	-13
Conflict	34,75	26,25	8,5
Idea Support	239,25	243,25	-4
Debate	197,25	199,25	-2
Risk taking	181,75	189,5	-7,75

Table 6-6, Average results of the SOQ of 'development' and Huisman (2006) &

	Results measurement 'development'	Results Huisman (2006)	Difference
Challenge & Involvement	234,5	225	9,5
Freedom	189,5	160	29,5
Trust & Openness	235,75	185	50,75
Idea Time	162,25	155	7,25
Playfulness & Humor	230,5	190	40,5
Conflict	26,25	50	-23,75
Idea Support	243,25	210	33,25
Debate	199,25	200	-0,75
Risk Taking	189,5	175	14,5

Appendix X: Interpretation a changing norm

Project 2: Interview met Project leader
Laat ik het zo zeggen tijdens de brainstorms is het meer out of the box denken waarschijnlijk, dus minder afgekaderd waar het eigenlijk om gaat. En binnen de fase waar we nu in zitten, is het iets beter afgekaderd, alleen is het veel moeilijk om een goede oplossing te vinden. BBB Dus het is eigenlijk een ander soort creativiteit.

Project 5: Interview met Project leader
RRR Hoe schat je nu het belang van creativiteit in? EEE Uhmm, je hebt natuurlijk verschillende vormen van creativiteit. Nu is het natuurlijk veel hardomlijnig. De specs, in het begin was het high level requirements, van nou er moet en dit en dit. Kom maar met ideeën, van maximaal creativiteit hoe je functies kan inkaderen. Dat was aan het begin. Nu heb je natuurlijk creativiteit, maar is de scoop heel erg beperkt. Er zijn zelfs details specs hoe de ---functie in elkaar moet zitten. Maar dan nog heb je creativiteit nodig om daar mee om te gaan.

EEE Ik denk dat teamleden nu meer vrijheid en minder vrijheid hebben. Minder vrijheid in de scoop en de specs. en de details, en meer vrijheid omdat ik ze meer vrijer laat, omdat het dan op vakkennis aankomt. En dan laat ik ze veel meer vrij, in die zin. Als projectleider, spreek ik nu, spreek ik ze gewoon op hun verantwoordelijkheid aan en minder intensief in die creatieve fase zit je er veel dichter op. Dan doe je samen die creatieve sessies en heb je veel meer samen meetings. En nu heb je alleen maar voortgangsmeetings. Nu duik ik niet in de details. En vind ik gewoon dat ze dat vanuit hun vak gewoon moeten kunnen.

Project 5: Interview met Project Principle
opgedrongen wordt. RRR De vrijheid wordt minder maar ondertussen is er nog genoeg over, zeg maar. *HHH De bewegingsruimte die wordt op een gegeven moment minder, maar... Kijk in het begin wordt natuurlijk nagedacht over weet ik wat en op een gegeven moment worden er keuzes gemaakt en het speelveld wordt kleiner maar ik denk dat mensen daar nog zelf, nog steeds voldoende vrijheid kunnen ervaren. RRR binnen hun domein is alles open natuurlijk. HHH Maar we hebben in principe, kijk wat we doen is, het probleem dat op tafel wordt gelegd dat leggen we* neer. En dat is aan het team om de vrijheid op deze manier te besluiten. Kijk ik kan *persoon* niet vertellen dat hij in Excel moet tekenen of dat hij graphics moet maken. Dat zoekt hij maar zelf uit.

Project 6: Interview met Project leader
En op dit moment hebben wij nog een enkele vrijheid. Zoals ik dat noem, dat het design nog niet helemaal bevroren is. Maar die vrijheid is nu al duidelijk minder, dan aan het begin van de ontwikkelingsfase. AAA Ja. Wanneer was dat ongeveer? Periode. BBB Anderhalf tot twee jaar geleden. AAA Oké, dit is dus vrijheid met betrekking tot de oplossingsrichting, die is beperkt, en vrijheid t.o.v. het proces? Als een teamlid nu even besluit van ik wil nu even rustig er een paar uurtjes aan werken, kan dat dan of er is dan ook maar beperkte tijd en budget voor hem? BBB Intussen zijn wij toch heel beperkt wat betreft tijd. In eerste instantie omdat zeg maar de mensen toch relatief dicht gepland zijn, voor de activiteiten die ze hebben. De verschillende activiteiten en in zover ook voor het project zoals het hier is. Ze hebben bepaalde tijd ter beschikking om de hoofdlijnen verder te brengen, aan die wij werken. Van proces of van product en die zijn toch relatief duidelijk gedefinieerd. En ook voor de toekomst voor de verdere planning is het zo gedefinieerd dat er niet veel speelruimte meer is, om andere zaken nog te bedenken in te brengen of te veranderen. Op dit moment van het project in deze fase.

Trust and Openness. BBB Dat zie ik binnen het project tenminste binnen de ontwikkelingsgroep in #. Wij hebben een open communicatie en vertrouwen met elkaar van iedereen. AAA Binnen het netwerk is het moeilijker? BBB Binnen het netwerk is het soms moeilijker maar ik denk dat ook daar, als ik het laatste jaar terug kijk, er toch ook een samenwerking was gebaseerd op vertrouwen. Misschien in de beginfase van het project was dat soms moeilijk i.v.m. miscommunicatie en misunderstanding. Wat soms ook op het vertrouwen kan gaan. De éne met de andere heeft een bijdrage en met de samenwerking.

Appendix XI: Data used for the Cohen's Kappa test

The data used for the Cohen's Kappa test, is presented in three parts First, the assigned scores of the coder 1 is presented. Second, the assigned scores of the coder 2 have been presented. Third, in a crosstables, the classification of the coders has been summarized. These crosstables have been presented, which have been used for the Cohen's Kappa test.

1.1)Results interview Measurement Point 1: of the *first* coder, the researcher of this study

Table 6-7, Results of interview of the SOQ: at '*Brainstorm*'

Project	Function	Challenge & Involvement	Freedom	Idea support	Trust And Openness	Playfulness& humor	Debates	Conflict	Risk Taking	Idea time
Project 1	Project Manager (1)	2	1	2	3	2	1	0	0	1
	Project Manager (2)	1	1	1	3	1	0	0	1	2
	Project Owner	2	2	2	3	3	1	0	0	2
Project 2	Project Manager	3	1	*	3	2	1	0	0	2
	Developer	2	2	1	3	2	1	0	1	2
Project 3	Project leader	2	1	1	3	2	1	0	0	1
Project 4	Project leader	2	1	1	3	2	1	0	0	2
Average		2,0	1,3	1,3	3,0	2,0	0,9	0,0	0,3	1,7

*** no answer is given during the interview.**

1.2) Results interview Measurement Point 2, coder 1

Table 6-8: Results of interview of the SOQ, of the first coded, at *'development'*

Project	Function	Challenge & Involvement	Freedom	Idea support	Trust & Openness	Playfulness& Humor	Debates	Conflict	Risk Taking	Idea Time
Project 1	Project Manager (1)	2	3	2,5	3	2	1	0	0	2
Project 5	Project leader	2	2	2,5	3	2	2	0	0,5	2
Project 5	Project owner	2,5	2,5	*	2,5	3	2	0	1,5	*
Project 5	developer	2,5	2,5	2,5	2	2,5	2	0	1	2
Project 6	Project leader	2	1	1,5	2	2	2	1,5	2,5	2
Average		2,2	2,2	2,25	2,5	2,3	1,8	0,3	1,1	2

*** no answer is given during the interview.**

2.1) Results *'brainstorm'* of the second judge, another graduate student at Philips Industry consulting

The results of assigning scores to the interviews related to the organizational climate for creativity, during the brainstorm sessions are presented in table 6-9.

Table 6-9, The results of second coder of assigning scores to the interviews related to the organizational climate for creativity, during the *'brainstorm'*.

Project	Function	Challenge & Involvement	Freedom	Idea support	Trust And Openness	Playfulness& humor	Debates	Conflict	Risk Taking	Idea time
Project 1	Project manager (1)	**2**	**1**	**2**	**2**	**2**		**0**	**-**	**1**
	Project manager (2)	**1**	**1**	**1**	**2**	**1**	**0**	**0**	**1**	**2**
	Project principle	**2**	**3**	**3**	**3**	**3**	**1**	**0**	**-**	
Project 2	Project manager	**1**	**2**		**3**	**2**	**2**	**0**	**-**	**2**
	Developer	**2**	**2**		**2**	**2**	**1**	**0**	**-**	**1**
Project 3	Project leader	**2**	**1**	**0**	**3**	**2**	**0**	**0**	**-**	**0**
Project 4	Project leader	**2**	**1**	**0**		**2**	**1**	**0**	**-**	**1**

*** no answer is given during the interview.**

2.1) Results *'development'* of the second judge, another graduate student at Philips Industry consulting

Table 6-10, The results of second coder of assigning scores to the interviews related to the organizational climate for creativity, during the *'development'*.

Project	Function	Challenge & Involvement	Freedom	Idea support	Trust & Openness	Playfulness& Humor	Debates	Conflict	Risk Taking	Idea Time
Project 1	Project manager	**1**	**3**	**1**	**2**	**2**	**-**	**0**	**-**	**2**
Project 5	Project leader	**2**	**2**	**2**	**3**	**1**	**2**	**0**	**-**	**2**
Project 5	Project owner	**2**	**2**	**-**	**2**	**2**	**2**	**-**	**-**	**-**
Project 5	Developer	**2**	**2**	**2**	**-**	**3**	**1**	**0**	**-**	**2**
Project 6	Project leader	**1**	**1**	**1**	**1**	**2**	**2**	**1**	**-**	**1**

*** no answer is given during the interview.**

3) Overview of crosstables

In table 6-11 the data used to execute the Cohen's Kappa test has been presented.

Table 6-11, Data used for the Cohen's Kappa test: 'Brainstorm' and 'Development'

'Brainstorm': k= 0,63				
Respondent 1 / Respondent 2	**0**	**1**	**2**	**3**
0	*8*	4	0	0
1	0	*12*	2	1
2	0	2	*14*	3
3	0	0	5	*5*

'Development': k =0,49				
Respondent 1 / Respondent 2	**0**	**1**	**2**	**3**
0	*3*	3	0	0
1	0	*3*	7	0
2	0	0	*17*	2
3	0	0	0	*3*

Appendix XII: Answer of dimensions related to multiple methods

The answer of the dimension Risk taking, Debate, Trust & Openness, and Idea Time have been presented both for related to the brainstorm session and related to the development activity.

The dimension Risk Taking, related to the brainstorm session

Project 1: Interview met Project leader
AAA 'Risk Taking' of er risico's genomen warden dus. Ja in zekere zin wel .Met een vernieuwend idee komen is altijd een risico. Het risico om uitgelachen te worden. Het risico om met een idee te komen dat niet haalbaar is. Het risico om met een idee te komen dat helemaal niet binnen de scope valt en daardoor door de facilitatorr terug gefloten worden. Het zijn geen drama's maar ik denk wel dat het in zekere zin als een risico kan aanvoelen.

Project 2: Interview met Project leader
AAA In feite is het risico, je zegt wilde ideeën maar omdat het binnen een brainstormsessie is zit er weinig risico aan. BBB Ja, kijk heeft sowieso geen risico. Daar wordt je juist gevraagd om wilde ideeën te genereren. En ik denk ook dat dat... Ik denk dat we daar ook wel een beetje op aangestuurd hebben. Bij de introductie van de brainstorm dat het gewoon nodig is om wilde ideeën te genereren, anders halen we onze doelstelling niet.

Project 3: Interview met project leader
Nee.

Project 4: Interview met project leader
BBB Dat zie ik niet direct hoe je dit kunt vertalen naar een brainstorm. Je bedoelt dat je buiten je vakgebied gaat? Of hoe bedoel je dit? AAA Op moment dat je concepten gaat uitwerken en je gaat op een gegeven moment een prototype maken dan neem je echt risico's. BBB Dan pas krijg je echte risico's. Of op moment dat je keuzes gaat maken tussen concepten. Dat je zegt dit is het beste ontwerp of dit is hét ontwerp dat we gaan uitwerken. Dan zit je op risico gebied. Dat heb ik bewust niet gedaan.

The dimension Risk Taking, related to development activities

Project 1: Interview met project leader
BBB Ik weet niet of dat echt een risico is dat je hebt. AAA Ja, er is eigenlijk weinig risico in het hele project geweest, of niet. BBB Er zit eigenlijk helemaal geen risico. Kijk als je een creatieve sessie belegd met mensen van design en techneuten bij elkaar dan weet je van ten dat daar wel ideeën uit gaan komen. De kans dat daar geen bruikbare ideeën uit naar voren komen is eigenlijk zo klein, dat kun je moeilijk als risico factor herkennen.

Project 2: Interview met project leader
BBB Nee, daar is niet zo'n grote risico's. Er is een risico een beetje in als ik het zo mag vertalen, van waar staan mensen onder druk, dan is het in tijd en in geld, hè. Dus ze zijn beperkt in tijd er is gewoon afgesproken, wanneer iets af moet. Dus of je dat gaat halen, ja of nee, daar zit enige vorm van risico in, maar heel weinig.

Project 6: Interview met project leader
AAA Risk Taking HHH Risk Taking? Risk Taking is een punt dat steeds nog actueel is voor ons. Wij hebben nog bepaalde risico's, waarmee we moeten omgaan. Technisch kostmatig, timing en dat wordt binnen de groep ook besproken. En dan samen trekken wij conclusies, om te zien hoe wij met bepaalde

risico's moeten omgaan. Of wij dat naar een hoger niveau moeten door communiceren. En duidelijk te maken wat welke risico's zijn en wat de consequenties kunnen zijn.

The dimension Debate, related to the brainstorm activities

Project 2: Interview met Project leader
Mensen die het product kennen en al hun hele leven in werken denken nog steeds in hetzelfde product, dat is juist het moeilijke aan zo'n proces. Die denken van; 'Oh het moet wel op deze machines gemaakt kunnen worden.', terwijl ik duidelijk had aangegeven dat in tegenstelling tot alles dat we voorheen hebben gedaan hier dat niet een randvoorwaarde is. Maar dat kun je wel vertellen, en ook twee keer vertellen maar uiteindelijk dringt dat dan toch niet door. Het was pas de s'avonds, de avond na de eerste brainstorm dat we hier stonden en er kwam nog een brainstormtje op gang waarin het duidelijk werd, dat dit speelde. Dat het nog niet helemaal was geaccepteerd was.en dat heeft er ook aan bijgedragen dat het de tweede dag misschien wat beter ging.

Project 3: Interview met Project leader
Daar blijf ik bij dat ik dat te weinig vond. Je zit in die hele function tree wat maar spuien, spuien, spuien is. Zo'n dingen daar blijf je iets te lang in hangen. En op moment dat je echt bezig bent om echt dingen te combineren daar was gewoon net wat te weinig tijd voor. Dit ging meer zo van dan schrijf je er wat dingen bij en dan naar het volgende dan dat je.. Ik had gewoon graag gezien dat je kwaliteit en de diepte in was gedoken. Wat meer over business en markt. Etc etc.

Project 4: Interview met Project leader.
BBB Dingen bespreken, ja werd gedaan. Maar er werd ook redelijk na de tijd gekeken. Een debat bij een eerste brainstormsessie leidt ook weer vaak tot een oplossing van het daadwerkelijke probleem. En dan ga je weer verder in detail. En dat wil ik wel een beetje verkomen. Om niet te ver in detail te gaan en tot een oplossing te komen op.. En daarmee misschien wel een idee een prullenbak in te werpen. Op dat moment kun je alles kapot gaan redeneren. Met debatten over en weer, niemand heeft data op tafel liggen om dingen te bewijzen. De één heeft iets meer kennis dan de andere op bepaalde vakgebieden, nou dat zal dan wel. Iedereen werd gewaardeerd voor zijn competenties. En als werd gezegd van oké dit kan, ik heb dit wel eens gezien dan werd dat aangenomen. En dat werd dat even voor waar. Nou dat is denk ik goed.

The dimension Trust & Openness, related to the brainstorm activities

Project 2: Interview met Project leader
AAA Trust and Openness, dat mensen gewoon rustig tegen elkaar alles kunnen zeggen tijdens de brainstorm sessie zonder dat er gevolgen kunnen zijn. BBB Nou dat was goed. AAA Vertrouwen daar....BBB Ik denk dat het een heel ontspannen sfeer was. En zelfs een gezellige sfeer. En dat is voor mij een goede graadmeter. Je moet natuurlijk uitkijken dat het niet te gezellig wordt, maar in ieder geval als er een beetje gezelligheid van af straalt dan wil dat toch zeggen dat iedereen acteert zoals hij graag zou willen acteren. Er zijn uitzonderingen maar over het al gemeen ging het goed. AAA Er zijn uitzonderingen bij de brainstormsessie of bij andere brainstormsessies? Nee, ik doelde nu even op dat er ook personen zijn die niet open zijn. En dat is dan meteen al een aandachtspunt. Waarom zijn die dan dat niet enzo? Maar het waren gelukkig uitzonderingen. AAA En bij de algemene activiteiten rondom de brainstormsessie? Hoe is daar de 'Trust and Openness? BBB dat is altijd goed. AAA Dat is ook logisch.

Project 3: Interview met Project leader
Dat was goed.

Project 4: Interview met Project leader
Trust and Openness, kon je gewoon alles opschrijven. BBB Ja.

The dimension Idea Time, related to the brainstorm activities

Project 2: Interview met Project leader
BBB Ja, ik denk dat die vrijheid er wel was. Ja dat hangt een beetje samen met elkaar aanvullen, een beetje met debat. Kijk als mensen het debat aangaan dan is er niemand die dat zal afremmen. In die zin is daar wel even tijd voor. En daarnaast is iedereen in de gelegenheid geweest om de beste ideeën uit te kiezen en daar nog eens dunnetjes en in iets meer detail op door te gaan. Dus die vrijheid is er dan al geweest.

Project 3: Interview met Project leader
Nee. Ik vond dit een van zijn mindere brainstorms omdat we veel te lang zijn we door die function tree heen gegaan wat uiteindelijk iedereen wel weet dus. Er waas veel te weinig tijd om dit achteraf uit te werken. Even mijn mening, want persoon is daar wat positiever over. En dat vond ik jammer want normaal is juist die periode waar je samen met een man of drie vier bezig bent aan een idee, is vaak waar echt goede ideeën komen en waar je wat aan gaat hebben. AAA Een man of drie vier zeg je? BBB Ja, je gaat op een gegeven moment met kleine groepjes verder en dan ben je echt die ideeën aan het verzinnen, hoe zou het eruit zien etc. En wat heeft het voor implicaties, nou. Die tijd vond ik gewoon te kort. En dat is een gevolg van dat het in het begin van de ochtend nog wat traag was allemaal.

Project 4: Iinterview met Project leader
BBB Nee ik geloof niet in lange brainstormsessies. Ik denk dat op een gegeven moment de energie op is om creatief te zijn. En dan kun je beter een nieuwe sessie organiseren. AAA Zou dat waardevol zijn geweest? BBB nou je zou nu nog een sessie kunnen organiseren om nog een slag dieper te gaan. Om hetgeen dat we nu in concepten hebben, en ook nog vrij oppervlakkig is om daar nog een stap dieper te gaan en iets verder uit te werken en meer tot de details te komen. Wat betreft ideeën concepten generatie denk ik nou ja, dat hoeft niet. Dat voegt misschien nog wel iets toe maar daar komen geen wereldschokkende dingen meer uit. AAA Genoeg ideeën zijn er en de goede zijn al gefilterd. BBB Ja. Ja, de ideeën die je nu nog zou kunnen genereren zijn combinaties van andere ideeën. Maar dat staat er eigenlijk al, want je hebt al de matrix. Je kunt die matrix nog een derde dimensie geven. Dat wordt daarmee alleen maar complexer. En dat kan nooit op allerlei kwadranten dus. Je raakt het overzicht kwijt en dan ben je ook je doel voorbij.

The dimension Idea Time, related general NPD development

Project 1: Interview met Project leader
Tenslotte, Idea Time is die er nog? Is er echt voldoende tijd of is het op budget letten en snel afmaken. De tijd is in principe ruim voldoende geweest, voor het totale project. Dus de tijd is niet het probleem.

Project 5: Interview met Project leader project 5
AAA En de laatste Idea Time. Hebben jullie genoeg tijd om alles uit te kunnen werken. BBB Het is beperkt, er zit een stok achter. Maar het is niet dat, dat hectisch is. Bewijzen van spreken. Die druk is er wel, het is niet onbeperkt hè. Maar die is realistisch. AAA En was dat eerst anders? BBB nee, we hebben altijd met de opdrachtgever, realistische tijden kunnen afspreken. AAA Ja, gewoon goed.

Project 6: Iinterview met Project leader
Idea Time. Tijd om ideeën uit te werken. Het is eigenlijk al aan bod gekomen, maar.. Is die.. BBB Ja, zoals… Als dat ideeën zijn die in verband met problemen, oplossingen van problemen te maken hebben dan is het noodzakelijk de tijd te hebben om hier aan te werken. Als het ideeën zijn die niet aan de hoofdlijnen bijdrage op dit moment dan is het soms zo dat er geen dat er geen grote tijd ter beschikking staat om hieraan verder te werken. Dat betekent dat de capaciteit totaal heel beperkt is en dat iedereen zich op het hoofdtarget moet richten.

Appendix XIII: Overview of success of team, based on interviews

Project 1: Telefoongesprek met Project leader
Eerder al is er een powerpoint presentatie verstuurd en naar aanleiding daarvan werd direct gevraagd om de echte modellen te sturen. Het lijkt dus of mensen er enthousiast over zijn. De mensen vonden de foto's in elk geval al mooi. Eén van de ideeën wordt misschien al opgenomen in een laatste productversie en komt misschien daarmee als onderdeel volgend jaar al op de markt.
(Dit komt uit een telefoon gesprek met projectleider)

Project 2: Interview met Project leader
Passage1:
Op dit moment zijn er twee selectie rondes geweest en nu zijn er nog zes concepten over. Deze concepten zijn afgelopen maandag voorgelegd aan onze eindklant en die was ook erg positief over het resultaat. Ik zie daar het puntje milestone staan, dit is geen echte milestone maar het is wel een goed teken denk ik. In ieder geval vond hij ook dat er goed werk was geleverd. Er waren eerst twee of drie ideeën verwacht en nu blijken het er zes te zijn dus dat is heel goed.

Passage 2:
De intentie van het project was niet om daadwerkelijk iets te gaan maken maar om te kijken in hoeverre het waarschijnlijk is dat één van onze concurrenten één van die concepten zal kiezen om ons uit de markt te drukken. De kans is aanwezig dat de concurrent dit kan, maar het positieve is dat een aantal van die concepten we ook zelf zouden kunnen maken. Dus daar komt dan een mogelijk vervolg traject op.

Project 5: Interview met Project leader
Toen hebben we gebrainstormd en zijn we gestart met een functieboom te maken. En die ideeën hebben we weer gestopt in product concepten. Dit vonden ze aardig en daar zijn er een paar van over gebleven in vijf thema's. Die hebben we op papier uitgetest of dat werkte, dus het waren vijf thema's. En toen hebben we gekeken, die thema's blijven die nog over als we daar eens beter naar gaan kijken. Want die creatieve fase is niet geremd door enige vorm van realiteit. En de derde fase hebben we één thema en zijn we niet alleen op papier gaan uittesten, maar zijn we een prototype gaan maken om te kijken of het nog steeds feasable is. En daar zitten we nu midden in. Dat wordt zeg maar begin november, is daar het einde van.

Project 6: Interview met Project leader
Passage 1:
Maar inmiddels zijn we verder gekomen en het design is verder ontwikkeld en getest ook met verschillende validaties tijdens de ontwikkelingsfase 1, maar we zijn nog steeds nog voor de design freeze. En er zijn nog verschillende technische risico's die ook nog in het design staan en daarvoor is natuurlijk een bepaalde creativiteit ook binnen de groep gevraagd, om hier met oplossingen te komen, oplossingen te bedenken hoe die technische problemen opgelost kunnen worden. Dat zijn misschien detail oplossingen van bepaalde punten, want het concept als totaal concept dat staat.

Passage 2:
En dat is dan één functie waar wij aan verschillende punten nog zien dat er nog risico's zijn. Dat met deze vorm van constructie en proces die wij nu al als hoofdlijn uitwerken, dat daar nog een bepaald risico zit dat het toch nog niet proces zeker waterdicht gemaakt kan worden. En daarvoor, als dat nog steeds is, doen wij proeven uitvoeren om te kijken hoe het verbeterd kan worden, of hebben we een alternatief proces of design, die we als backup dan meenemen. En waterdichtheid is hier nog een belangrijk punt. RRR Daar kan ik me iets bij voorstellen.