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Univ.-Prof. Dr. Helmut Krcmar

What Gets an Idea Included?

The Impact of Group Dynamics on Idea Inclusion in Team Meetings

Tobias Schlachtbauer, M.Sc.

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Vorsitzender:		Prof. Dr. Florian Matthes
Prüfer der Dissertation:	1.	Prof. Dr. Helmut Krcmar
	2.	Prof. Dr. Michael Schermann

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Abstract

Motivation: Working in teams on solving complex tasks, including software development or service design, is common in today's organizations. All these tasks require some creativity. This is especially true if the creation of innovative solutions to a problem is required. On the one hand, research findings suggest that teams are preferable to individuals for solving problems because the diverse points of view might spark more creative solutions. On the other hand, groups are found being prone to detrimental behaviors like groupthink or choosing not the best design. The disadvantages of groups are often attributed to misunderstandings due to the divers disciplinary or cultural background of the team members. Yet, other issues might be at play that leads to situations in which a team does not realize the full potential of the individual team members.

Research Method: Our study combines ethnographic observation with grounded theory to investigate how proposed solutions for an assigned design problem evolve over the course of a project. A central aspect of our investigation is the analysis of group-related reasons for the inclusion of a team member's suggested ideas.

Results: Overall, it is found that a variety of group dynamics affect whether suggested ideas are kept or discarded. Our observations include dynamics in relation to the rhetoric strategies of team members (i.e., repeated mentioning and soliciting support), the influence of higher status persons on a team's decisions (i.e., referring to authority) as well as the team's approaches regarding the shared use of the media that contains the final design (i.e., controlling the media). In addition, we theorized that the four dimensions (1) inertia, (2) authoritative source, (3) media and (4) time affect whether an idea is included or not.

Research Implications: Using grounded theory methods and ethnographic observations this thesis looked in-depth what factors facilitate idea inclusion in a team's work meetings. Irrespective of considerations of an idea's actual value or quality, we found that individual behaviors and group dynamics have a decisive influence on whether an idea is included in the result or not.

Practical Implications: This work only develops hypotheses of what affects the final outcome of a design team. Yet, it suggests that efforts for improving individual creativity might not be as effective as efforts for managing group dynamics in determining the feasibility and uniqueness of a group design.

Originality: Our study lends further support to research, which shows that group dynamics affect idea elaboration in teams. In addition, based on our observation of the team members' verbal and non-verbal behaviors, we theorized that four dimensions affect idea inclusion. Furthermore, instead of using interviews we conducted an ethnographic observation study using audio and video recordings of actual instances of teams working together. Moreover, we investigated the creative work of functional teams that tackled a relevant assigned design problem in the domain of information systems research, i.e., the design and development of new mobile services.

Keywords: Group dynamics, innovation, idea elaboration, grounded theory, ethnography

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List of Abbreviations and Acronyms

A	authoritative source
APS	adult playfulness scale
AR	augmented reality
C	customer
CPS	computer playfulness scale
CSS	cascading style sheets
CTO	chief technology officer
GATE	Garching Technology and Business Incubator
H	hypothesis
H1	hypothesis one
H2	hypothesis two
H3	hypothesis three
H4	hypothesis four
HTML	hyper text markup language
I	inertia
IAMT	inertia, authoritative source, media and time
ICT	information and communication technology
IS	information systems
IT	information technology
L	lecturer
M	media
OLIW	other-directed, lighthearted, intellectual, whimsical
PHP	PHP: hypertext preprocessor
PIIT	personal innovativeness in the domain of information technology
PS	playfulness scale
RQ	research question
RQ1	research question one
RQ2	research question two
RQ3	research question three
S	staff
SD	standard deviation
SDK	software development kit
SQL	structured query language
SR	self-rating of creativity
T	time
TA	teaching assistant
TIP theory	theory of time, interaction, and performance
TUM	Technical University of Munich
US	the United States
XML	extensible markup language

1. Introduction

> *Getting groups right is critical because collaboration is rapidly becoming the norm in science and in invention. (Sawyer, 2012, p. 232)*
>
> *No one works completely independently. Almost everyone is part of at least one group, typically several groups at any point in time. (Nunamaker, Dennis, Valacich, Vogel, & George, 1991, p. 41)*

In this chapter, we state the aim of this thesis and explain why this research is important. The chapter is organized as follows. This chapter first presents our motivation and the relevance of the investigation of project teams working on the development of new products and services. The chapter then states the thesis' objectives and the investigated research questions. Finally, the chapter presents the structure of the thesis.

1.1 Motivation and Relevance

Companies across the globe face the need to innovate in order to become or stay competitive. The economic success of a company depends largely on its ability to improve its existing product and service portfolio as well as to develop and market new product or service innovations (Reichwald & Piller, 2005, p. 52; Verworn & Herstatt, 2007, p. 4).

As the development of an innovation starts with a creative idea (Amabile, 1988, p. 126), which may then lead to an opportunity for innovation (Verworn & Herstatt, 2007, p. 8), it is not surprising that creativity and the selection of the best idea are widely recognized as very important for the success of innovation activities (Girotra, Terwiesch, & Ulrich, 2010, p. 591; Hennessey & Amabile, 2010, p. 570). However, an idea is mere the beginning rather an end in innovation and new product or service development projects. Ideas may create value only after further investment of resources (e.g., knowledge, time, or money) into the development of the idea (Kornish & Ulrich, 2011, p. 107). That is, an initial idea – no matter how good it is – has to be evolved into a promising solution. As Christensen and Raynor (2003) aptly write:

> *Rarely does an idea for a new-growth business emerge fully formed from an innovative employee's head. No matter how well articulated a concept or insight might be, it must be shaped and modified, often significantly, as it gets fleshed out into a business plan that can win funding from the corporation. (Christensen & Raynor, 2003, p. 9)*

During the process of shaping and modifying an innovation idea into a proposed solution, which is then presented to management for a go/no-go decision (Verworn & Herstatt, 2007, p. 8), lots of additional ideas are created that alter the initial innovation idea according to the new knowledge acquired during its elaboration (Nonaka & Kenney, 1991; von Krogh, Ichijo, & Nonaka, 2000).

If only one person would be involved in the elaboration of the idea, the inclusion of emerging idea into the proposed solution would be totally incumbent upon the decisions of this person. In this situation, all decisions would be based on individual factors of the person, including

personal creativity, expertise and preferences. Yet, similar to the case mentioned above with regard to an initial idea that is rarely fully formed right away, this scenario is unlikely and also unfavorable. First, it is unlikely, because, working in teams is commonplace for knowledge-intensive activities in ambiguous and uncertain settings, including research and innovation (Goh, Goodman, & Weingart, 2013, p. 160; Sawyer, 2012, p. 232). For example, Wuchty, Jones and Uzzi (2007) found that nowadays the production of knowledge in science, engineering and patents is mainly carried out in teams (Wuchty et al., 2007, p. 1036). Second, it is unfavorable, because, although literature on creativity suggests that individuals outperform teams in terms of quality and quantity when it comes to the generation of ideas in brainstorming sessions (Mullen, Johnson, & Salas, 1991, p. 18), teams are found to be superior when it comes to the elaboration of ideas (Singh & Fleming, 2010, p. 54f; Wuchty et al., 2007, p. 1038). This might be because of the diverse knowledge of a group of people, which enables them to generate more ideas, and thus, also more novel combinations in the pursuit of finding the best solution (Singh & Fleming, 2010, p. 55).

Although groups may have advantages over individuals in the important process of idea elaboration, ideas are also lost because of group-related causes. Research found that teams are prone to many detrimental effects, including productivity loss (Mullen et al., 1991) and groupthink (Janis, 1972). In addition, some people's own experiences and reports of anecdotal evidence about dysfunctional groups (e.g. Lencioni, 2002) suggest that working in a group made "[…] everyone less creative and less productive than they might have been otherwise" (Sawyer, 2012, p. 232). In addition, similar points have been made regarding meetings. For example, Hackman (2002) suggests that teams are perceived as not working as intended because they meet for tasks that would be better done by an individual (Hackman, 2002, p. 248f). However, getting rid of meetings is not an option because some tasks require the combination of skills and expert knowledge from different domains, and thus, make team meetings necessary (Kauffeld & Lehmann-Willenbrock, 2012, p. 131).

Working in teams on tasks with no obvious answer is widespread in organizations and team meetings are an essential part of this teamwork (Kauffeld & Lehmann-Willenbrock, 2012, p. 131). In addition, an initial idea regarding an innovation opportunity is only the starting point in the process of creating innovative products or services. More ideas have to be created, elaborated and integrated during the development of a proposed solution for a promising new product or service. Yet, not every beneficial idea that is mentioned during a team meeting will also be included in the team's final concept for a new product or service. Some valuable ideas are mentioned but for some reasons get lost. Therefore, gaining a deeper understanding about the group dynamics that affect the inclusion of ideas in team meetings is important.

This research aims at addressing an important gap in the scientific literature. Most of our knowledge about teams that work on creative tasks is based on laboratory experiments (McGrath, 1991, p. 149; 1997, p. 15f; Paulus, Dzindolet, & Kohn, 2012, p. 328). Even though more recent studies apply non-experimental methods, including interviews or surveys (Paulus & Nijstad, 2003, p. 198), ethnographic studies, which address this topic through the in-depth investigation of functional teams working on actual problems, are scarce but valuable (e.g. Goh et al., 2013). In addition, we investigate specifically how group dynamics affect the inclusion or exclusion of ideas in team meetings. Which is an important, yet hardly

investigated, topic since small group research focuses predominantly on the ideational creativity or work performance of groups and teams.

1.2 Objectives and Research Questions

First, this section describes the overall research goal. Then it states the research questions that structure and guide this research.

The objective of this research is to shed new light on the question why some ideas get included in a project team's final design and others do not. This is an important question because in new product and service development projects, creative ideas are only the starting point. Initial ideas have to be evolved into a final solution. This requires, besides the combination and development of existing ideas, also the creation of new ideas for solving occurring problems and overcoming obstacles.

In this thesis, we investigate how group dynamics affect the results of a team's design meetings. Those meetings focus on the design of certain aspects of the final solution and therefore influence the team's final design in a fundamental way. We focus on team meetings and the respective meeting results instead of the overall design process and the respective final design for two reasons. First, we want to study the dynamics in the team and how they affect the meeting result. Consequently, even though external stakeholder and other events affect the ideas discussed in the meetings, only the activities and dynamics of the team members, who work on the creation of the meeting result, have a direct effect on whether an idea is included or not. Second, we want to observe the actual interactions among the team members instead of survey their interpretations because research findings suggest that reports about events could miss out mentioning influential stimuli if they were not salient or if they were not a plausible causes for a result (Nisbett & Wilson, 1977, p. 231).

We study the discovery phase of the innovation process (cf. Durmuşoğlu & Barczak, 2011, p. 322). That is, the "fuzzy front end" (Trott, 2008, p. 405) of the innovation process, in which idea generation and concept development take place (Reid & de Brentani, 2004, p. 171; Trott, 2008, p. 14). This phase precedes the decision about the formal development of a new product or service innovation (Trott, 2008, p. 405). Consequently, the goal of this phase is the creation of a proposed solution that decision makers might approve for subsequent development projects. In this phase, the characteristics of the problem as well as of the innovation outcome are still blurry and ambiguous (Goh et al., 2013, p. 165), and thus, the team has to simultaneously elaborate both problem and solution (Wiltschnig, Christensen, & Ball, 2013, p. 515).

The discovery phase of innovation projects is especially interesting for our study on idea inclusion because teams generate many ideas during this phase and the inclusion or exclusion of ideas affects significantly the final design of the proposed solution. In addition, teams commonly create low-cost, throwaway representations of their ideas in form of sketches and low-fidelity prototypes to foster the communication and discussion of ideas (Buxton, 2007; Mascitelli, 2000; Schrage, 2000). The team's behavior around theses artifacts is particularly interesting because anecdotal evidence suggests that sketches and prototypes influence how people innovate together (Schlachtbauer, Schermann, & Krcmar, 2013, p. 2; Schrage, 2000, p.

xvii), articulate ideas about the final software product (Schrage, 2004, p. 45), explore alternatives (Lim, Stolterman, & Tenenberg, 2008, p. 1; Schlachtbauer et al., 2013, p. 6), and create knowledge in groups (Bogers & Horst, 2014, p. 744; Mascitelli, 2000, p. 187).

The thesis pursues two aims. First, we want to discover factors in relation to group dynamics that affect ideas inclusion. Therefore, the inclusion or exclusion of each team member's suggestions is examined in relation to why this inclusion or exclusion occurred. The result is a number of hypotheses regarding the effect of certain group dynamics on idea inclusion. Second, we want to aggregate theoretical dimensions pertaining to our hypotheses to determine the essential quality of theory. Therefore, we look for the underlying theoretical categories of our hypotheses and try to understand how theses categories fit together into a coherent picture. That is, we theorize about the theoretical categories and their interrelation pertaining to our hypotheses and observations. The result is a model showing the theoretical dimensions that affect group dynamics with respect to idea inclusion.

For the purpose of the thesis, we studied the evolution of assigned design problems in teams. This research focuses on teams and the respective group dynamics instead of individuals for the following two reasons. First, working in teams is commonplace in today's companies especially for knowledge-intensive activities in ambiguous and uncertain settings, including research and innovation (Goh et al., 2013, p. 160; Sawyer, 2012, p. 232). Second, the interaction between team members might have a higher impact on the creativity of the outcome than the individual creative ability of the individual members of the team (Hargadon & Bechky, 2006, p. 497).

According to Sawyer (2012, p. 233) two general approaches exist for the study of teams: input-output and process. The input-output approach investigates how different input factors (e.g., group composition, task instruction, incentives, resources provided) affect the outcome (e.g., effectiveness) of a team (Sawyer, 2012, p. 233). The process approach investigates the interactions and processes within a team in order to explain why certain inputs lead to certain outputs (Sawyer, 2012, p. 233).

As we are interested in why an idea is included or not, i.e., the dynamic processes in the team that lead to the inclusion or exclusion of ideas, we decided to apply the process approach for our study of teams. We want to understand what happens during interactions in teams in order to refine and expand theory on group creativity and provide advice for practitioners for managing teams better. The overall research question driving our research design is:

> *Why does an idea get included in (or excluded from) the meeting result of a new mobile service design team?*

To explore this research question, we conducted an inductive study, in which we used grounded theory methods for the analysis of ethnographic observations. The research is structured and guided along three research questions. First, we are interested in what is already known about social and group influences on the creative work in small groups. Consequently, our first research question (RQ) is:

RQ1 What is the state of scientific knowledge regarding social influences and small group research in relation to creative work?

Answering this question provides information about what has been done before and identifies gaps in the current knowledge. The research question is addressed by conducting a literature review. With respect to the thesis' object of investigation we focus our review on small groups and teams. Thereby we put a special focus on research in relation to design and creative work. In addition, as groups and teams are social systems we consider also theories regarding social influences.

Second, we want to identify possible factors in relation to group dynamics that affect the inclusion of an idea into the shared result of a team during a design meeting. In addition, we will analyze whether our research validates or contradicts factors that have already been identified in the scientific literature. Thereby, we are especially interested in the individual team members' ways of proposing an idea, their teammates' reactions to it and the consequence with respect to idea inclusion. Consequently, our second research question is:

RQ2 Which possible factors in relation to group dynamics affect the inclusion of an idea into the shared result of a team that is working at a creative task during a meeting?

Answering this question leads to hypotheses about the group dynamics that affect the inclusion of ideas during design activities in team meetings. To address this research question, we examined a video collection of five meetings for three teams with the goal of generating hypotheses on group dynamics that lead to idea inclusion. Using grounded theory methods, video-based interaction analysis and ethnographic observations, the inclusion of each team member's suggestion is examined in relation to why this inclusion occurred. At this point, it is worth mentioning that we do not use grounded theory methods on interview data, which is common in information systems research, but carry out a detailed ethnographic analysis based on observations and video data. Even though it is more work and harder to do, the analysis of video data is advantageous because it discloses the actual social interaction between two or more participants as it unfolds over time. Besides the videotapes of the meetings we include also archival data (e.g., photos of the meeting results, project reports and presentations) and our field notes in our analysis in order to assess whether an idea was included in the outcome of a team meeting or not.

Third, we want to determine the essential quality of our findings with respect to our emerging theory by aggregating the theoretical dimensions pertaining to our hypotheses. Therefore, we have to look for the underlying theoretical categories of our hypotheses and attempt to understand how theses categories fit together. Consequently, our third research question is:

RQ3 What are the main dimensions that affect idea inclusion or exclusion in team meetings and how do they theoretically interrelate?

Answering this question leads to an emerging theory about the dimensions and their interrelations that provoke the inclusion or exclusion of ideas in team meetings. To address this research question we build on the findings from our second research question to model

the theoretical dimensions (i.e., the components of the model) and their theoretical interrelation regarding idea inclusion in team meetings. This will strengthen our understanding of factors in relation to group dynamics that affect whether an idea is included in a team's shared outcome or not. Finally, we contrast and discuss our model and its components in relation to established theories.

1.3 Structure of the Thesis

Chapter 1 provides the introduction. First, it states the motivation and relevance of the thesis' topic. Second, it describes the research objective and the research questions that guide and structure this thesis. Finally, it sets out the structure of the thesis.

Chapter 2 sets out the research methodology. First, it explains grounded theory. Second, it describes why grounded theory is a useful method in information systems research. Third, it states why we used a grounded theory research approach and why we decided to analyze video data instead of interview data. Fourth, it explains how we used the grounded theory research approach. The chapter ends with a brief summary of our applied research methodology.

Chapter 3 provides the conceptual basis for this work. First, we state the views on ideas and creativity taken in this work. Second, we provide background information on innovation as well as the role of symbol systems and distributed cognition for collaborative work. Third, we state the interpretation of project teams taken in this work and explain the important role of team meetings in collaborative work. Finally, we introduce group dynamics as a central aspect of this thesis.

Chapter 4 comprises the theoretical foundations for our research on idea inclusion in project teams. First, it describes the approach taken in conducting the literature review. Second, it provides an overview of important research on social influences on individuals and groups. Third, it provides an overview of important research in the area of small group research in relation to creative work in teams. The chapter ends by explaining where this work fits in, which research gap it addresses and why it is original.

Chapter 5 describes the research approach of our empirical study on idea inclusion in project teams. First, it describes the selected research methods for conducting the data collection and analysis. Second, it describes the setting of this research. Third, it describes the case analyzed in the thesis and the data that was collected in combination with the rationale for its collection. Finally, we describe the process and the tools for the analysis of the data.

Chapter 6 provides the findings of our research on idea inclusion in project teams. First, it provides a summary of our findings and states the hypotheses generated. Each of the subsequent chapters describes one of our hypotheses on factors affecting idea inclusion in relation to group dynamics. These chapters first describe the thesis' hypotheses in more detail. Second, they provide illustrative examples that support the hypotheses as well as illustrative counterexamples, if applicable. Finally, it discusses the respective hypothesis in relation to extant literature and provides alternative explanations.

Chapter 7 discusses what we have found and its importance. First, it presents and describes the model on the theoretical interrelations of the constructed categories. Second, it explains each category in detail. Thereby, it relates each category to the respective hypotheses and observations that led to the construction of the category and discusses its occurring and effect. The chapter finishes with a general discussion of our model and its components in relation to established theories and research findings.

Chapter 8 summarizes our achieved results, states the theoretical and practical implications of our research, and points out its limitations. Finally, the thesis concludes with suggestions for future research.

2. Research Methodology

This chapter describes our strategy of inquiry and justifies its choice. First, we give an explanation of what grounded theory is. Second, we argue why grounded theory has become such a useful method in information systems (IS) research and give some examples of IS grounded theory studies. Third, we state why we have decided to use this approach. Finally, we explain how we use this research approach, i.e., we describe the particular adaptations we made to this approach in order to make it applicable to our research study. Overall, this chapter explains and justifies the application of grounded theory to our research problem.

2.1 Explaining Grounded Theory

Before we explain why and describe how we apply grounded theory in this thesis, we want to explain in general what grounded theory is and how it works. This is an important first step because the term grounded theory is not self-explanatory and it is all too often used incorrectly for qualitative research that is not grounded theory. See, for example, the complaints by Suddaby (2006) about what grounded theory is not or the variety of grounded theory approaches identified by Matavire and Brown (2013).

This section illustrates the process of developing a grounded theory according to the seminal book about constructivist grounded theory by Charmaz (2006, 2014) using an example from everyday life. We use the study of the shopping experience in a supermarket in the United States as an example because shopping is a common activity making the example easy to understand and likely to resemble personal experiences. The research objective of the example study is to gain a deeper understanding of the social interactions between the sales staff and the customer, and eventually formulate a tentative theory to explain how these interactions influence the purchasing decisions of the customer. Please keep in mind that this is only a fictitious example to explain grounded theory rather than providing a theory about the shopping experience in supermarkets in the United States (US).

In the following paragraphs we name and explain the individual nine main activities of a grounded theory study with the aid of the previously introduced illustrative example. If not stated otherwise, our description and explanation of the method is based on the book "Constructing Grounded Theory" by Charmaz (2006, 2014). First, we choose the starting point of our investigation. In doing so we decide how (i.e., with which methods) and where (i.e., who or what will be our first sample) we want to collect our initial set of data. We speak deliberately of initial data, because during the development of a grounded theory we will collect additional data and analyze the extant data simultaneously with the new data collection in an iterative process. While the way data collection and analysis are intertwined is unique to grounded theory, it shares applicable tools for data gathering with other research approaches. Or put differently, a wide variety of tools can be used in order to gather data for a grounded theory study including qualitative data elicitation tools such as interviews or observations as well as quantitative data elicitation tools such as questionnaires. In our case, we decided to collect observational data (i.e., how we gather our data) at Wegmans (i.e., where we gather our data), a family-owned US regional supermarket chain, because we regarded it as an ideal place for observing interactions between the sales staff and the customer that are typical for shopping in the United States.

Second, we collect an initial set of data for our first round of analysis. During our data collection, we observe several interactions between the sales staff and customers, for example, when customers ask the sales staff where to find certain products or when the sales staff offer customers certain foods to try for free. We pay close attention to the conversations as well as to observing people's behavior and taking detailed notes.

Third, after the first round of data collection, we start immediately with the analytical process by coding the data. That is, we apply qualitative codes (descriptive labels) to fragments of our data (words, sentences, actions). During this process, which is known as "initial coding" (Charmaz, 2006, p. 42ff), we transform our concrete observed data into more abstract statements that allow subsequent analytical interpretations. For example, we might have coded the utterance of the Customer (C) "C: Excuse me, please." as 'speaking politely to a sales staff' and the utterance "C: May I ask you where I could find the firewood?" as 'making a polite inquiry about a purchase item'. In addition, we might code the sales staff's (S) response "S: It should be right outside this door." as 'giving directions', "S: If we still have some." as 'expressing uncertainty about stock', "S: I'm sorry." as 'responding with regret', "S: I'm from a different department." as 'providing justification/excuse' and "S: I can't check the current stock of firewood with my computer." as 'providing justification/excuse'. We used the gerund instead of the noun form for our codes as suggested by Glaser (1978) in order to preserve a sense of action instead of drawing too much attention to the topic of the action (Charmaz, 2006, p. 49). Along with the initial coding, we are already thinking about possible theoretical categories, i.e., categories that relate to general principles or at this stage of the process, hypotheses about general principles that these codes might indicate. In this case, a possible theoretical category would be 'politeness' because of its presence in the conversation between the customer and the sales staff.

Before we proceed to the next coding phase in our example, we mention some important recommendations for initial coding according to Charmaz (2006, pp. 45-57). A. During initial coding it is important that we keep our minds open and that we are cautious about biases that might intentionally or unintentionally lead to forcing the data into preconceived theoretical categories instead of letting them emerge from the data. B. Initial coding is intended to create and assign descriptive labels to your data for subsequent analysis. These labels should be close to the data and express the participant's view. This means that one should avoid the use of professional language and, instead, use the participant's language to describe a phenomenon. C. The codes should be short and simple yet precise and meaningful because they shape your analytical frame in the process of building a theory. D. As mentioned before, gerunds should be used instead of nouns to preserve a sense of action and sequence in the codes. E. The data needs to be compared constantly with other data of the same category, of preceding or subsequent events and different sizes of the unit of data being coded (e.g., the codes of actions and statements can be compared with those of larger incidents. F. One should work fast and let unconstrained spontaneity aid the coding. This helps to trigger fresh thoughts and create a new view of the data. Overall, initial coding is not only the beginning of the coding process but also a first step in the analytical reasoning about the data and a useful tool in gaining an understanding of the phenomenon from the participant's perspective. In addition, initial coding helps to reveal areas in which the available data is not sufficient for the attainment of an understanding of the phenomenon in its necessary depth.

Fourth, we proceed to the next phase of coding when we have assigned initial codes to all of our relevant data and have reached a strong analytical direction through the application of comparative methods to the data. This phase is called “focused coding” (Charmaz, 2006, p. 57ff) and is intended to sort out the bulk of existing codes in order to reduce it to those codes that make the most sense from an analytical point of view. For this purpose the most important (i.e., the most significant and/or frequent) initial code is selected and used as a filter. For example, we could choose the code ‘providing justification/excuse’ because it occurs more often than the other codes and the codes with the word ‘polite” in it because it seems to be a significant theme. However, the intent of focused coding is not to filter out seemingly irrelevant initial codes but to synthesize and condense the codes in order to explain larger parts of the data. During focused coding we compare data with data to identify the codes that we think explain best what we see in the data and compare data to these codes to develop those codes into refined tentative conceptual categories as well as to specify their relationships (cf. Thornberg & Charmaz, 2014, p. 159).

In relation to the coding process, it is very important to understand that the objective of grounded theory is neither to test a theory nor to build a theory based on solely logical reasoning about how phenomena could be explained or predicted but to create a theory that is grounded in data, i.e., to develop a theory inductively from bottom-up processes by collecting data and iteratively abstracting them into theoretical categories while going back and forth between data collection and analysis. Therefore, the process of going from initial coding to focused coding is not linear but intertwined. The selection of focused codes and the analytical thinking in which we engage during this process might cause previously implicit actions or utterances to become explicit, and we may experience a moment of insight, i.e., a feeling of suddenly understanding a complex situation. This means that we will go back to our data and use our attained insight to go through all of it again. For example, we might realize that the staff’s expression “S: I’m sorry.” is actually not expressing his or her regret but is more of a kind of response to an idiomatic phrase like the English informal greeting “How are you?” where no one would expect a literal response but rather one of the typical responses like “I'm very well, thank you. How are you?”. This insight requires us to go back to our initial coding and re-examine the data again. Thereby, we now realize that there is a lot of protocol-like talk between the sales staff and the customer that occurs alongside the communication of the factual message. We further recognize that we can distinguish between two kinds of this protocol-like talk: expressions for the sake of politeness and expressions for promoting an action. Overall, the main utility of grounded theory coding derives from actively acting upon the data instead of only passively reacting to the data. Some of the most interesting findings emerge only after several iterations of going back and forth over the data, reinterpreting and refining the initial codes as well as the tentative conceptual categories and their relationships. Via this method, we gain a deeper understanding of the phenomena under investigation and this leads to the emergence of new and unexpected ideas. This is also one thing that makes grounded theory a valuable method. It would not be a grounded theory study if the data and the coding did not alter our understanding of the world.

Fifth, we can now - but do not have to - apply a third type of coding called “axial coding” (Charmaz, 2006, p. 60ff) that has been developed and is advocated by Corbin and Strauss (2014). While the purpose of the initial coding was to break the concrete data into pieces of abstract statements and to analyze how they relate to each other, the purpose of axial coding is

to put those pieces back together in order to develop a major category. This type of coding is called axial coding because - according to Strauss and Corbin (1998, p. 124f) - it relates categories (the phenomena under investigation) with their subcategories (the properties and dimensions of a phenomenon). The development of the subcategories takes place by answering questions about the conditions (why, where, and when), the actions and interactions (by whom and how) and the consequences of these actions and interactions (what happens) (Charmaz, 2006, p. 61). For example, with respect to the phenomenon of "politeness" we might ask who acts polite (answer: the customer as well as the sales staff), what happens (answer: the customer is served by the sales staff when possible or at least directed to someone else who could help) and why (a definite answer to the questions asked is not possible based on the data we have, but the observed behavior indicates that the sales staff is obligated to act in this way). Again, we see a gap in our data that suggests where (at supermarkets), with whom (sales staff) and how (semi-structured interviews) to collect further data. According to Charmaz's (2006, p. 61) point of view, following the formal process of axial coding as suggested by Corbin and Strauss might be helpful when one feels overwhelmed by the ambiguity of the data. It is, however, not necessary to adhere strictly to this organizing schema. One can also treat this organizing schema as flexible guidelines and follow the leads, which one defines in the empirical material. In addition, as with all types of coding in grounded theory, there is no strict sequential order, which prescribes that one type of coding has to follow another. This type of coding only requires the presence of some categories (Strauss & Corbin, 1998, p. 124).

Sixth, we may now - but do not have to - proceed to "theoretical coding" (Charmaz, 2006, p. 63ff). Theoretical codes provide an analytical tool that is based on the inherent logic of existing theories in order to formulate coherent relationships between the created categories and create a sound theoretical story. That is, in contrast to the initial, focused and axial codes, which are grounded in data and empirical observations, the theoretical codes provide an outside view to the data. However, this outside view is only of value if it is related to the previously developed codes. One can think of theoretical codes as predefined relationships between abstract categories or as Glaser puts it "theoretical coding families" (Glaser, 1978, p. 73). The purpose of theoretical coding is more in support of a clear and precise communication of the developed theory to others than an even further engagement of deriving meaning from the data. That is, theoretical coding helps to maintain a conceptual stance on thinking and directs writing towards more theoretical considerations about the developed concepts and their relations instead of getting lost in the details and nuances of the available data when stating the emergent theory.

Therefore, Glaser (1978, pp. 74-82) provides a non-exhaustive set of 18 theoretical coding families, which are neither mutually exclusive nor disjoint. The coding families not only exhibit the relationship between the constituting parts of the families but also provide the commonly accepted terms for those parts. Based on our example of the shopping experience in a supermarket in the United States, we could apply several theoretical coding families. For example, the coding family "Process" (Glaser, 1978, p. 74) would apply because all of our observed interactions had at least two stages: (1) someone has an objective and tries to achieve it and (2) the result of this trail irrespective of the fact whether the objective was achieved or not. In addition, the protocol-like conversations between a customer and a sales staff can be perceived as sequences in the process' progression. In addition, the "Interactive

Family" (Glaser, 1978, p. 76), which focuses on mutual or reciprocal action, might work with respect to the concept of politeness and its relationship to the achievement of one's goal when shopping. Polite behavior helps the customer to find and finally get the articles he or she wants and in turn the fulfillment of the customer's needs might lead to polite behavior. It is hard to tell which comes first. However, they are interactive no matter how it started. Overall, theoretical coding is at an advanced level of coding because it specifies potential relationships between the categories that were created during focused and/or axial coding and provides the necessary vocabulary and relationships for thinking and writing about a sound and coherent emerging theory.

Yet, with regard to theoretical coding Charmaz (2006, p. 64) urges caution not to force the existing empirical codes into the predetermined categories of one of the theoretical coding families but only to use theoretical codes that were indicated by the analysis of the data. In addition, Charmaz (2006, p. 65) criticizes that Glaser (1978) neither specified the exact qualities of a theoretical coding family nor listed criteria for what constitutes an acceptable coding family. Furthermore, Charmaz (2006, p. 66) points out that theoretical codes are - despite their appearance - neither objective nor is there a common agreement among scholars about them. Thus, an uncritical application of theoretical codes is not recommended.

Before we proceed and introduce memo-writing - a tool that is used throughout the whole grounded theory study - we want to briefly create awareness as to preconceptions and their influence on one's perception of the data that is coded. Coding is an influential part in developing a grounded theory given that it is used to abstract data and create conceptual categories, which then are used to theorize about the relationships between the categories and to construct an explicit theoretical logic that explains a phenomenon of interest. Charmaz (2006, p. 67) points out that not only forcing the data into existing codes and categories is an issue that the researcher, who uses grounded theory, should be aware, but also that a researcher's perception of the world (based on their class, race, gender, age, etc.) intermingles with coding and analyzing the data. In relation to our example of studying the shopping experience in US supermarkets, this means that we have to be aware of our German cultural background and the preconceived theories we hold based on our own shopping experience. For example, a researcher with an US cultural background might interpret the sales staff's behavior as rule-bound because he or she is aware of the fact that behaving polite is part of a sales staff's job training and their instructions requires them to behave in a manner that is considered to be perceived as polite. However, based on a German cultural background a researcher might consider the sales staff's behavior as to be actually polite because he or she is used to more direct and outcome-driven conversation style (C: "Where is the firewood?"; S: "Go outside. It should be to your left.") and might have expected to find this to be even more prevalent in the US based on a cultural misconception. Thus, Charmaz (2006, p. 68) emphasizes the necessity to achieve a deep knowledge about the phenomenon under investigation as well as about the studied participants in order to be able to analyze the phenomenon from their frame of reference.

Seventh, we introduce and explain memo-writing (Charmaz, 2006, p. 72ff) - according to Charmaz (2006, p. 72) "a crucial method in grounded theory" - which is not necessarily a subsequent step of the whole coding and analyzing process but rather an intermediate step of it. While codes and analytical categories reveal something about the data, memos reveal

something about the codes, categories and the analysis. Charmaz (2006) summarizes the value of memos as follows: “Memos catch your thoughts, capture the comparisons and connections you make, and crystallize questions and directions for you to pursue” (Charmaz, 2006, p. 72). A. Memos are a means to explicate one’s thought and ideas. The act of writing memos in combination with reflective thinking about their content might trigger new ideas and insights about codes, categories, relationships or even the studied phenomenon. Moreover, memos collect thoughts and enable a researcher to keep track of their rational during coding and analysis. Additionally, memos facilitate the storage and retrieval of ideas and notes along the stages of the analysis, making the task of working with them tangible and manageable. B. Memos facilitate the development and elaboration of categories during the later coding processes such as focused coding. For the purpose of grounded theory, memos are written for personal use and serve an analytical purpose. In this way, memos resemble a personal inner dialogue in written form - in an informal and personal language - and thus express the otherwise intangible thinking and knowledge regarding insight through comparing data with data, data with codes, codes with codes, codes with categories and categories with categories. C. Memos facilitate the identification of questions that are still unsolved. In addition, they indicate weaknesses in the researcher’s ideas and disclose categories that need further strengthening. Thereby, memos make the researcher realize that additional data is needed in order to explain the phenomenon of interest. For example, with respect to our supermarket example we might think the sales staff apologizes and is polite, since she does not know whether there is still firewood outdoors. But why is she giving all this additional information and explains herself towards the customer? Why is she adding so much in the way of apologizing for not knowing the answer? Instead of giving all the excuses, which do not solve the customer’s problem, she could have called a colleague who knows the answer, which would have actually helped the customer. Yet, maybe she thought the customer was in a hurry and with no other articles to buy sending the customer outside where the firewood should be would be the fastest way to answer her question. If there is still firewood outside, then the customer has found what she was looking for. If not, then she was already outside and thus closer to the next destination in search of firewood. With the data at hand we just can't tell whether the sales staff acted in the customer's or in her best interest. We still need to collect and analyze more data to answer these questions.

Memos do not have a predefined form, structure or length and there is also no special method to create memos. The purpose of memos is to facilitate exploration and discovery and aid the identification of patterns. Thus, Charmaz’s main advice is “do what works for you” (Charmaz, 2006, p. 80) and “write whatever comes to you” (Charmaz, 2006, p. 81). Memos can be written down as bullet point lists or short notes and may gradually evolve into rich descriptions of, for example, data, codes, situations, ideas or emerging concepts and categories. All memos should be stored in chronological file copies, so that earlier memos can be readily retrieved and used in the analytical process throughout the complete study.

Although there is no prescription on how to create memos, Charmaz (2006, pp. 82-85) provides the following recommendations with regard to memo-writing based on her long-standing experience. A. Start a memo by giving it a title, for example, the code that will be analyzed in this memo. B. Identify and follow the clues that the investigated category and its respective data suggest. That means that a researcher should be explicit about the evolutions and changes of a category that take place on the bases of new hunches or insights during the

analysis of the codes and the corresponding data. C. Engage in the elicitation of meaning based on implicit, unexpressed, and condensed codes. That means that a researcher should search for the hidden assumptions that underlie a category and ask themselves questions about what it actually means from a participant's point of view in order to explicate their implicit meanings and assumptions. D. Start with memo-writing right from the beginning of your study; as soon as you have initial ideas and categories. E. Perceive and treat memos not as finished information but rather as work-in-progress data that is partial and provisional. For each memo, indicate what content is based on hard evidence and what is merely a hypothesis based on speculation and conjecture. F. Do not worry about spelling or grammar, but rather focus on quickly and clearly writing the idea down. G. Write memos in a natural voice that resembles human thinking and feeling. H. Begin with memos about codes that compare the beliefs or actions of different participants and compare new data with the statements in these memos after the development of tentative analytic categories in order to create a strong distinction between the categories as well as a solid and substantive definition of a category's properties. Write additional memos with a detailed comparison between categories whenever a new category is being developed. I. Make sure that the memos contain not only the analytical and often abstract reasoning but also the data that supports it. Remember, the core objective of grounded theory is the identification of patterns (i.e., categories and their relations) in the collected data and the creation of a theory (i.e., a set of propositions that can explain the identified patterns) that is grounded in the data (i.e., the propositions are substantiated by means of an in-depth analysis of the data).

For example, an early memo of our supermarket example could look like this:

> Being polite as a sales staff's personal principle:
>
> Being polite as a sales staff's personal principle suggests that being polite is more of the kind of an inner driving force rather than based on external requirements. It even appears to be an attitude towards life, that is, a person's integrated views of what is important in life and their assignment of valuations.
>
> In the conversation between the sales staff and the customer about where the firewood is stored and whether there is still some in stock, the sales staff first directed the customer to the location where the firewood is supposed to be (S: It should be right outside this door) and states right afterwards an expression of uncertainty (S: If we still have some). The interpretations of this statement are manifold. It could plain and simple indicate that the sales staff is not sure about it and mentions this without any further intentions. Or it could be that she consciously wanted to indicate her uncertainty regarding her first statement in order to save the customer an unnecessary walk. Or it could be that she just wanted to prevent herself possible negative consequences in case she sent the customer unavailingly outside and the customer afterwards complains about this to her manager. And so on. However, what is interesting is the next statement of the sales staff, which gives some more hints about the sales staff's possible intention regarding her previous statement (S: I'm sorry. I'm from a different department. I can't check the current stock of firewood with my computer.). The sales staff apologizes that she does not know the current stock of firewood and cannot retrieve it with her computer. With the statement "I'm from a

> different department." she provides also the reason for why she is not able to check the current stock on hand at her computer.
>
> This unquestioned justification of why the sales staff doesn't know the stock on hand of firewood and why she can't look it up on her computer leads to a lot more questions than can be currently solved: Why does she give all this additional information and explain herself towards the customer? Why is she giving so much information in addition to her apologizing? Instead of giving all the - from the customer's point of view somehow worthless - excuses she could have called a colleague who knows the answer. This would have actually helped the customer. Yet, maybe she thought the customer was in a hurry and - with seemingly no other articles to buy - the fastest way to answer her question was to send the customer to the place where the firewood should be. If there is still firewood outside, then the customer has found what she was looking for. If not, then she was already outside and thus closer to the next destination in search of firewood.
>
> With the data at hand it's not possible to tell whether the sales staff acted in the customer's or in her best interest. We still need more data to answer these questions.

So far we have collected, coded and analyzed an initial set of data. Through the application of the different coding methods as well as memo-writing, we have created some tentative categories. For example, we identified among others the tentative category "protocol-like communication" based on the analysis of our focused codes and in the process of theoretically rendering this empirical pattern we became aware of its similarities to the theoretical coding family "Process". However, we also realized that even though the identified categories are intriguing we currently lack empirical data to fully define these categories and their properties. Therefore, we apply the grounded theory strategy of "theoretical sampling" (Glaser & Strauss, 1967, p. 47) in our next step.

Eighth, as missing data has become apparent in the course of the prior analysis, the next step is concerned with "theoretical sampling" (Charmaz, 2006, p. 96ff). This sampling strategy deals with the decisions with regard to data collection for the next iteration of our grounded theory study. It is important not to mistake theoretical sampling with sampling strategies for conventional qualitative research. The purpose of theoretical sampling is to seek and collect data that is appropriate to refine and elaborate one or more categories of the emerging grounded theory. Whereas the purposes of other sampling strategies are based on considerations regarding the research question, the distribution of a certain population, the achievement of saturation of data or the discovery of a negative example. Theoretical sampling is also different from initial sampling in grounded theory. Considerations regarding initial sampling are focused on decisions about where to best start the data collection for the study. Considerations regarding theoretical sampling, on the other hand, are focused on conceptual and theoretical decisions about where to proceed with the data collection for the study. According to Charmaz, another frequent mistake is that researchers confuse theoretical sampling with data-gathering strategies that aim on the elaboration of "empirical *themes"* (Charmaz, 2006, p. 102 italics in the original) instead of the "explicit development of *theoretical* categories derived from analyses of their studied worlds" (Charmaz, 2006, p. 102 italics in the original). This is, the first one is concerned with the identification of similar

cases in order to make the findings appear more reliable, while the latter is concerned with the identifications of additional cases that might aid the elaboration of the tentative categories in order to make the emerging theory stronger.

Now that we have - based on Charmaz (2006, p. 96ff) - made clear what theoretical sampling is and how it is different to other sampling strategies, we want to proceed and explain briefly the principles of theoretical sampling according to Charmaz (2006, p. 102ff). Theoretical sampling is used to go back from data analysis to data collection. It is directed by writing memos about tentative theoretical categories and their relations through the identification of still unresolved answers, not sufficiently defined categories or hunches of alternative theoretical explanations. For example, with respect to our example of studying the shopping experience in US supermarkets we identified the concept of politeness and evolved it into the tentative theoretical category "interacting reciprocally polite". Broadly speaking this category states that the polite behavior between the customer and the sales staff is based on reciprocity, i.e., that people respond to a positive behavior or action also with a positive behavior or action. During memo-writing and constantly comparing other data and codes to this category we realize that in certain instances only the sales staff behaves polite while the customer shows a rude behavior. Yet, a closer look at the observations indicates that, over the course of the interaction between sales staff and customer, the rude behavior of the customer becomes increasingly polite. We have some hunches but we need more data about this phenomenon in the quest to further delineate the properties of this category. Based on a strategic decision we go back to the field and gather more data. This time we not only observe the interactions between sales staff and customer but also interview both afterwards in order to gain a deeper understanding about the phenomenon from their points of reference.

Another important aspect of theoretical sampling is concerned with the abductive logic of reasoning in grounded theory. According to Charmaz (2006) abductive reasoning means that a researcher considers "[...] all possible theoretical explanations for the data, [forms] hypotheses for each possible explanation, [checks] them empirically by examining data, and [pursues] the most plausible explanation" (Charmaz, 2006, p. 103f). This is, a researcher immerses themselves in the data and formulates candidate hypotheses for all possible explanations of an observed event or action, seeks confirmation as well as disconfirmation for the candidate hypotheses in the data, and selects those hypotheses that are worth further investigation from a theoretical point of view. The resulting hypotheses can then be used for the theoretical sampling in order to gather additional data to confirm or disconfirm, and thus, evaluate the quality of the current emerging theory. With regard to our example, a possible candidate hypotheses could be: The polite behavior of the sales staff has a reciprocal influence on the customer's behavior in such a way that it mitigates a customer's rude behavior.

Theoretical sampling is more like a strategy than a procedure. That is, theoretical sampling offers strategies to develop and elaborate tentative categories, identify variations in the observed processes and reveal opportunities for a more detailed definition of categories and their relations as well as the identification of missing categories. However, theoretical sampling does not prescribe which data should be gathered for what reason and how to conduct it. All of this is up to the researcher and depends only on the purpose of the collection of further empirical evidence in the field.

Ninth and finally, after going back and forth between the collection of further data and the analysis of the whole data set with comparative methods the tentative categories and relations evolve into a stable theory that stands on solid empirical ground. Yet, one more question has to be solved: When to stop? And the simple answer is: Stop, when the categories have reached a "theoretical saturation" (Charmaz, 2006, p. 113ff). According to Charmaz (2006) categories have reached a theoretical saturation "[...] when gathering fresh data no longer sparks new theoretical insights, nor reveals new properties of your core theoretical categories" (Charmaz, 2006, p. 113). That is, saturation does not simply mean that newly collected data only shows already known pattern but that - in spite of theoretical sampling - the newly collected data does not augment the theoretical categories any longer. In addition, theoretical sampling is nothing one can simply declare but one has to prove it. Therefore, Thornberg and Charmaz (2014, p. 167) provide a set of questions that help a researcher in the evaluation whether a grounded theory has reached theoretical saturation or not. These questions concern (1) the completeness of the grounded theory or its categories, (2) the precision, clarity and elaboration of definitions, (3) the completeness of the empirical data, and (4) the coherence of the findings. That means that in grounded theory the sample size is neither based on ex ante nor on ex post considerations but on the interim evaluation of the emerging theory and its categories. Moreover, in grounded theory the logic of theoretical sampling supersedes the focus on sample size of other conventional research approaches. However, while mundane theoretical claims can be based on a rather small sample size, rich theoretical claims that are extensive or contradict existing theories should be based on an adequate sample size and should demonstrate an exhaustive data set and a rigorous analysis in order to prevent skepticism.

The meaning of theoretical saturation, its usage and its consequences, however, cause some difficulties. Like other core strategies in grounded theory (e.g., theoretical sampling), the meaning of theoretical saturation is prone to misinterpretations and disagreement among researcher. In her book, Charmaz (2006) provides several examples for this. For example, she quotes Dey's (1999) critique about the term saturation in which he first points out that coding in grounded theory is partial and not exhaustive, and thus, saturation is a misleading metaphor, which suggests that the established "[...] categories [are] saturated by data [...]" (Charmaz, 2006, p. 114) whereas they are in reality rather "suggested by data" (Charmaz, 2006, p. 114). At a first glance, this criticism might appear very meticulous for a novice researcher who is currently learning the grounded theory method. However, with regard to Dey's second point of critique - the consequences of saturation - the actual pitfall becomes obvious. According to the interpretation of Charmaz (2006) "[Dey] wonders if saturation of categories itself is an artifact of how grounded theorists focus and manage data collection" (Charmaz, 2006, p. 114). That is, the same strategy that should provide the stop rule for further theoretical sampling, data collection and analysis in a grounded theory study could also be another strategy for the conduction of those processes. This also leads to a further point that Charmaz (2006) often emphasizes and which we briefly describe in the next paragraph.

One final remark on grounded theory research before we will summarize its process in the next paragraph. Charmaz (2006) emphasizes in her book "Constructing Grounded Theory" again and again that grounded theory strategies and methods should rather be treated as guidelines and tool than prescriptions and recipes. Throughout a whole grounded theory

study, the researcher should be constantly heedful that neither preconceived opinions nor blindly obeying a method's rules causes their study to result in a superficial theory.

In the following, we summarize the content of this chapter about grounded theory based on Charmaz (2006, 2014). In short, grounded theory is a research approach with the objective of constructing a theory (i.e., in the broadest sense a set of propositions about the world and the relationships within it) in order to explain a phenomenon of interest that is founded on a solid fundamental of empirical evidence. That is, grounded theory is intended to develop a theory as opposed to other methods like experiments that are concerned with testing a theory. In addition, as the name already says, the developed theory is grounded in data as opposed to solely being based on theoretical reasoning. That is, it is built on the basis of data that is elaborated through stepwise abstractions, constant comparison and recurring data collection according to theoretical considerations. The nine main activities for conducting grounded theory are:

1. Choose the starting point of the investigation by deciding how (i.e., with which methods) and where (i.e., who or what will be our first sample) to begin with the collection of data.

2. Collect an initial set of data on the basis of sampling criteria that are intended to acquire rich data about relevant people, events or activities.

3. Start immediately with the analytical process by initially coding the data, and thus, transform the concrete observed data into more abstract statements that allow subsequent analytical interpretations.

4. Proceed to focused coding when all of the relevant data has been initially coded and a strong analytical direction has been reached. Focused coding is intended to sort out the bulk of existing codes in order to reduce it to only those codes that match the evolving direction.

5. Proceed to axial coding and put the pieces of abstract statements, which were created through initial coding, back together in order to develop a major category. Axial coding is optional because the development of major categories can also be done during focused coding.

6. Proceed to theoretical coding using existing theories to possibly formulate coherent relationships between the created categories in order to create a sound theoretical story. Theoretical coding is optional because the theoretical reasoning can also be done on the basis of the developed tentative categories and their conjectured relationships without adhering to - and possibly even forcing the emergent theorizing into - predefined theoretical codes.

7. Engage in memo-writing throughout the whole grounded theory study. While codes and analytical categories reveal something about the data, memos reveal something about the codes, categories and the analysis process. In addition, memo-writing spurs

analytical thoughts about the data, captures the created comparisons and connections, and directs theoretical sampling and theorizing.

8. Engage in theoretical sampling, which is a sampling strategy that deals with decisions regarding data collection for the next iteration of the grounded theory study. In this way the sampling decisions are only concerned with theoretical considerations. After going back and forth between the collection of further data and the analysis of the whole data set with comparative methods the tentative categories and relations evolve more and more into a stable theory that stands on an increasingly solid empirical ground.

9. Evaluate the theoretical saturation of the developed categories. Saturation is reached as soon as new data no longer generates new theoretical insights and no longer suggests new properties of the developed main theoretical categories.

Although we have put these nine activities into a chronological order so that they can be better illustrated and explained, this is not intended to be a step by step workflow description that delineates how a grounded theory study should be carried out. The described activities only explain the core tools and strategies of a grounded theory study, why they are useful and it provides guidelines how they could be used. We end our explanation of the grounded theory method with a quote from Charmaz (2006) in which she gives an advice about how to conduct a grounded theory study:

> *Be open to what is happening in the field and be willing to grapple with it. When you get stuck, go back and recode earlier data and see if you define new leads. Use grounded theory guidelines to give you a handle on the material, not a machine that does the work for you. (Charmaz, 2006, p. 115)*

2.2 Why Grounded Theory is a Useful Method in Information Systems Research

In the previous sections, we explained the grounded theory method in combination with an illustrative example. In doing so, we described the main activities of a grounded theory study according to the constructivist grounded theory methods by Charmaz (2006, 2014). Although there exist other versions of grounded theory[1] we decided to follow the advice and methods of the constructivist approach. We decided to do so because it (1) is the most recent evolution of grounded theory, (2) takes previous grounded theory approaches into account and tries to advance their strengths while at the same time attempting to overcome their shortcomings, and (3) provides a set of principles and practices that guide the research process rather than prescribing it. Below, we argue why grounded theory is such a useful method in information systems and give some examples of IS grounded theory studies in order to demonstrate its usefulness.

[1] See, for example, Thornberg and Charmaz (2014, p. 153) for a brief overview, or Charmaz (2014, pp. 5-13) for a more detailed description of the history of grounded theory and the developmental turns.

We deem the use of grounded theory methods to be useful in information system research for the following five reasons. First, building theory is the core of academic research (Gregor, 2006, p. 613) and several seminal IS scholars previously called for more theory-building in IS (e.g. Weber, 2003; Zmud, 1998). Others have cautioned an unreflecting adoption of theories from other disciplines (e.g. Gregor, 2006, p. 635; Matavire & Brown, 2013, p. 119; Truex, Holmström, & Keil, 2006, p. 798f). Second, grounded theory is increasingly used in IS research (Matavire & Brown, 2013, p. 125) and has resulted in the resolution of paradoxical findings, for example, regarding the nature of ambidexterity in information technology (IT) transformation programs (Gregory, Keil, Muntermann, & Mähring, 2015) or regarding IS-related organizational change (Orlikowski, 1993). Third, the application of grounded theory leads to the emergence of theories about a phenomenon that is grounded in empirical observations (Bhattacherjee, 2012, p. 42) instead of forcing data to fit a preconceived theory (Glaser, 1992, p. 22). For example, Carlo et al. (2012) point out that the application of grounded theory at the early stages of their research led them "[...] to realize that a dialectic approach would be more valuable and offered a more plausible interpretation of the ongoing appropriations we were observing" (Carlo et al., 2012, p. 1088). Fourth, grounded theory incorporates the contextual complexities that are prevalent in the design, development and use of IS in the organizational context instead of simplifying or ignoring them (Orlikowski, 1993, p. 311). And finally, grounded theory facilitates "the generation of theories of process, sequence, and change pertaining to organizations, positions, and social interaction" (Glaser and Strauss, 1967, p. 114 as quoted by Orlikowski, 1993, p. 311).

In short, grounded theory is a useful method in IS research to develop a nuanced understanding about social phenomena (Bhattacherjee, 2012, p. 41f). It "[...] provides rigorous yet flexible guidelines [...]" (Thornberg & Charmaz, 2014, p. 153) that allow to capture reality in great detail and fosters the emergence of a theory that is grounded in data by its emphasis on constant comparison between the data and the emerging theory (Charmaz, 2014; Corbin & Strauss, 2014). The resulting theory is represented as a set of hypotheses which were developed and refined through iteratively moving between induction and abduction (Thornberg & Charmaz, 2014, p. 153) and which have reached a theoretical saturation (Corbin & Strauss, 2014, p. 198), i.e., when "additional data does not help improve the extant theory" (Bhattacherjee, 2012, p. 42) any further.

2.3 Why we Use a Grounded Theory Research Approach

Prior to this study, we investigated different factors that were expected to have an influence on the creative performance of design teams. Our overall research goal was to find out what makes a design team creative. We applied an exploratory case study design (Bhattacherjee, 2012, pp. 9,43) and observed eleven cases over the course of three years. In two of the cases, for example, we explored how different forms of prototyping affect the innovation behavior of project teams and found support for the hypothesis that the extensive usage of executable computer prototypes hampers exploratory activities in contrast to low-fidelity paper prototypes (Schlachtbauer et al., 2013). Altogether we observed 127 individuals who worked in 29 design teams that addressed eleven different challenges in the context of designing innovative mobile services to support effective and sustainable individual mobility.

Over the course of theses studies, we increasingly wondered why teams include one idea into their solution but exclude another one that was, at least from our perspective, equally or even more suitable for addressing the assigned design problem. We were not able to answer this question with the available data from the cases. However, we assumed that group-related factors might play an important role. However, little is known about how group dynamics affect the inclusion or exclusion of ideas. We are especially interested in gaining a deeper understanding of the strategies that team member use for including an idea into the team's overall solution when proposing it during a team meeting. Thus, we decided to apply grounded theory methods to construct a theory of process and sequence in relation to social interaction during collaborative design process (cf. Glaser & Strauss, 1967, p. 114).

We use the grounded theory approach because we are at the beginning stages of understanding how the dynamic behavior of team members during team meetings affect the inclusion and exclusion of ideas, and thereby, shape the team's final proposed solution. Therefore, instead of proposing an experiment to test a particular hypothesis, we attempt to look in depth at actual team meetings in the process of design and then generate possible hypotheses that would explain the results. In this way, we avoid running controlled experiments in which we might inadvertently remove an actual contributing factor from the design process. We also look at interactions in a real life situation and avoid the possible effect of experiment controls, which might change a group's behavior. In short, we are generating theory but not proving it, only suggesting from the data we have analyzed what might be possible reasons for the results we have observed in team meetings.

2.4 How we Use the Grounded Theory Research Approach

Our general research approach follows the constructivist grounded theory approach (cf. Charmaz, 2006, 2008; Charmaz, 2014; Thornberg & Charmaz, 2014), with the aim of generating an emergent theory on idea inclusion and exclusion in design meetings of project teams. Charmaz (2006, 2014) describes the constructivist grounded theory approach as "[…] a set of principles and practices […]" (Charmaz, 2006, p. 9) that guides the research process and provides coding and memo creation strategies. In addition, the more recent constructivist grounded theory takes the past development of grounded theory into account and it resembles our view that "[s]ocial realities are mutually constructed through interaction" (Thornberg & Charmaz, 2014, p. 154). That is, discovery does not lead to theory but rather to a researcher's sensemaking (Magala, 1997) and construction of meaning based on their interactions with participants and the analysis of the data (Charmaz, 2014, p. 13; Thornberg & Charmaz, 2014, p. 154).

While most of the common grounded theory studies use interviews as their primary data source (Charmaz, 2014, p. xviii), we decided that video[2] recorded observational data would be more suitable for our research for two reasons. First, we are interested in the actual social interaction between two or more participants as it unfolds over time (cf. Bakeman, 2000) in contrast to descriptions of events, processes or structures with hindsight (Roese & Vohs, 2012, p. 411). Activities and behaviors that lead to the inclusion or exclusion of an idea are

[2] In this thesis, we use the term video (as in video recording) to mean both video and audio capability.

not always salient or the result of a plausible cause, and thus, people might have trouble attributing the actual cause (e.g., a behavior of a team member) to the consequence (e.g., idea inclusion) (cf. Nisbett & Wilson, 1977, p. 231). In addition, nonverbal behavior is less likely to be properly recalled compared to verbal behavior (Nisbett & Wilson, 1977, p. 252). Moreover, the ex post explanation of reasons that lead to idea inclusion or exclusion is prone to sensemaking activities that, among other things, favor plausibility over accuracy (Weick, Sutcliffe, & Obstfeld, 2005, p. 415f). Thus, we consider that interviews do not provide a sufficiently rich basis for a theory on idea inclusion and exclusion in social interactions during collaborative design processes. Second, we used video recording in addition to audio recording because the interactions between members of design teams are manifold and often involve the creation of graphical representations like sketches alongside communication (Schön, 1983, p. 80f). These graphical representations in combination with pointing actions are important devices in the creation of a shared understanding and support the communication in the group (Linke, Nussbaumer, & Portmann, 2004, p. 155). Furthermore, video recording preserves the behaviors and interactions of interest for a subsequent in depth coding and analysis (Bakeman, 2000, p. 142; Henderson, 1989, p. 105) and provides the ability to correct possible misinterpretation by repeated viewings of individual scenes (Jordan & Henderson, 1995, p. 45; Suchman & Trigg, 1991, p. 78f), which is necessary for the construction of emerging concepts that explain how idea inclusion or exclusion take place in project teams.

However, the decision regarding the setting, in which we study the phenomena of interest, (i.e., design meetings of functional project teams) and the use of observational data instead of interviews comes not without disadvantageous consequences. The iterative process of collecting and analyzing data simultaneously, which is one of the major aspects that distinguish grounded theory from other approaches (Thornberg & Charmaz, 2014, p. 155f), is not applicable for our current study. Over the course of five weeks, we recorded five team meetings of three design teams, in which the team members collaboratively elaborated their ideas. The observed team meetings were embedded in a four-month university course at the Technical University of Munich (TUM), Germany, in order to ensure that the meetings resemble a realistic setting. The rich data collected during these meetings in combination with the short duration between the individual meetings made it impossible to thoroughly analyze the data simultaneously to its collection. Hence, theoretical sampling, i.e., the collection of additional data for the specific purpose of saturating the properties of an emergent category (Charmaz, 2014, p. 192), could not be done. Nonetheless, with an overall footage of about 20 hours of video recorded team meetings, the collected data is extensive and allows for the application of an iterative process of transcribing and analyzing the data simultaneously. In addition, the possibility for theoretical sampling, i.e., a sampling process that is guided by considerations regarding the emergent theory (Thornberg & Charmaz, 2014, p. 155), is also possible within the limitations of the extensive video footage.

Our research process is intended as follows. First, we view all videos, take notes on interesting observations and familiarize ourselves with the data. In addition, we create a rough content log as suggested by Jordan and Henderson (1995, p. 43) for conducting an interaction analysis. In a further step, we transcribe the video recorded observations using the qualitative research software Transana (Woods & Fassnacht, 2014). Given the extent of our audio-visual data, we belief that a full verbatim transcription of the 20 hour footage is not appropriate.

Furthermore, besides the participants' utterances, other forms of communication are also essential for our analysis including pointing actions and other nonverbal behavior. No matter how extensive we would transcribe the audio-visual data, a textual description of a group's interactions provides a lower abundance and richness of the observed interactions, communications and activities. Thus, we only create verbatim transcriptions of important incidents and provide a varying level of detail in the descriptive transcripts. The level of detail depends on the perceived value of the investigated scene.

Second, after a first screening of the footage, we will select one specific video as the starting point of our analysis. The most promising video to start with is the one of the initial meeting of the team, which created the best solution in comparison with the other two teams. We will use this video as a starting point for our coding.

Third, we conduct an initial coding phase followed by a focused coding phase and go back and forth between these two coding phases until the data provides no further insight (cf. Charmaz, 2006, pp. 42ff,57ff). In addition, we create first candidate hypotheses parallel to the construction of tentative categories and select those hypotheses that we deem "[…] a worthy candidate for further investigation" (Thornberg & Charmaz, 2014, p. 153) while we discard others. During this process, we are constantly looking in the data for confirmation as well as disconfirmation of our candidate hypotheses.

Fourth, we select the next sequences for our analysis based on theoretical reasoning about what instances might either lead to the confirmation or disconfirmation of one of our candidate hypotheses or may create new insights, and thus, spur the creation of new candidate hypotheses. We expand our analysis of the data stepwise to other meetings of the same team as well as the meetings of the two other teams and precede the aforementioned steps until we reach either saturation or the available data is exhausted.

2.5 Summary

In this chapter, we describe the research method that we apply in this thesis and justify its choice. First, we give an explanation of what grounded theory is and why the grounded theory approach is such a useful method in IS research. Second, we discuss why we use this approach. Third, we explaine how we use this approach and describe what data we use. Overall, this chapter explains and justifies the application of grounded theory as viable research methodology for our research.

3. Conceptual Basis

The aim of this chapter is to develop the conceptual foundation of the present work. On the basis of scientific literature, we define important terms and expose our understanding of concepts that are important in this thesis.

In this thesis we study teams working at the early stages of the innovation process. At this stage, the team members set the foundations for the development of innovative products and services, which are intended to enable a company becoming or staying economically successful (Reichwald & Piller, 2005, p. 52; Verworn & Herstatt, 2007, p. 4). Thereby, the creative elaboration of ideas is a central aspect (Christensen & Raynor, 2003, p. 9), which is likely carried out by a team, because working in teams is prevalent in organizations for tasks with no obvious answer (Goh et al., 2013, p. 160; Kauffeld & Lehmann-Willenbrock, 2012, p. 131; Sawyer, 2012, p. 232). For example, design thinking has become a popular approach in organizations in which teams work on the development of an innovative solution for solving a relevant problem from a user's point of view (Brown & Wyatt, 2010, p. 32; Thoring & Müller, 2011, p. 139). During this process the team generates and explores many ideas. Even though the final solution may be predicated on one single idea, it was significantly shaped by the many small ideas, which were generated and included during the development of the final solution (Wylant, 2008, p. 12).

As the aforementioned concepts such as idea, creativity, or innovation are studied in various disciplines besides IS research, have numberus definitions and are also used in everyday speech, we need to explain our understanding of these concepts. In addition, we want to explain other concepts like distributed cognition, teams and group dynamics that are important for this work but are less known in IS research.

The remainder of this chapter is organized as follows. First, we state the views on ideas and creativity taken in this work. Second, we provide background information on innovation as well as the role of symbol systems and distributed cognition for collaborative work. Third, we state the interpretation of project teams taken in this work and explain the important role of team meetings in collaborative work. Finally, we introduce group dynamics as a central aspect of this thesis.

3.1 Ideas and Creativity

This section explains the conceptual basis of ideas and creativity as they are understood and used in this work. This is important as both phenomena have been studied in various disciplines and are conceptualized from numerous points of views. As the two concepts are related they are jointly explained in this section.

Ideas and creativity are important ingredients for the design and development of new products or services. Developing new products or services requires a combination of divergent and convergent thinking activities (Woodman, Sawyer, & Griffin, 1993, p. 299). Both are central aspects of creativity (Sawyer, 2012, p. 51). Divergent thinking is the unprejudiced generation and exploration of multiple alternative ideas and answers to a problem (Guilford, 1959, p. 470; O'Quin & Besemer, 2011, p. 273; Sawyer, 2012, p. 46). In contrast, convergent thinking

is the analytic examination of an idea's validity to deduce a single suitable solution or answer (Drago & Heilman, 2012, p. 606; Guilford, 1959, p. 470; Sawyer, 2012, p. 46).

Idea

The term idea is used in many disciplines and defined in various ways. A general definition is given in the online version of Merriam-Webster's dictionary, which defines an idea as (1) "a thought, plan, or suggestion about what to do", (2) "an opinion or belief" or (3) "something that you imagine or picture in your mind" (Merriam-Webster, n.d.). According to this definition, an idea is mainly a mental product that resides in an individual's mind. Rhodes (1961) complements this definition by stating that an idea is "[…] a thought that has been communicated to other people […]" (Rhodes, 1961, p. 309). That is, an idea is a thought that resides not only within an individual's mind but is expressed in some form and received by other people.

In relation to the subject of this thesis, we find the scientific definitions of an idea according to creativity and innovation literature especially relevant. In creativity research an idea is often viewed as the outcome of creative thought processes or activities and is therefore considered in relation to its novelty and usefulness (Vandenbosch, Saatcioglu, & Fay, 2006, p. 260). Yet, novelty and usefulness are neither an inherent attribute of an idea nor are they always desirable. With respect to problem solving in organizations, old and/or imperfect ideas could also provide a suitable solution (Vandenbosch et al., 2006, p. 260). In addition, research on human cognition suggests that an individual's knowledge influence ideas and therefore new ideas are "[…] heavily structured in predictable ways by the properties of existing categories and concepts" (Ward, 1995, p. 157). Therefore, even novel ideas are only the result of novel combinations of already existing knowledge.

Innovation Research, on the other hand, considers the term idea as a plan that is to be implemented (Vandenbosch et al., 2006, p. 260). Consequently, an idea – especially a creative idea – is perceived as the starting point of innovation (Amabile, 1988, p. 126; Boeddrich, 2004, p. 274). In this connection, a new idea is merely a thought or collection of thoughts, which have to be further elaborated into an invention and eventually an innovation (Trott, 2008, p. 14). Evolving an original idea into an innovation is a dynamic process in which individuals and/or teams gain new knowledge as well as generate, test and include additional ideas (Goh et al., 2013, pp. 162, 175).

Overall, an idea can be thought of as a fuzzy draft of a solution to a problem that needs further elaboration based on intellectual processes in order to turn it into a feasible solution (Boeddrich, 2004, p. 278).

Creativity

In an interview, the Nobel Prize winner Herbert Simon (1990, p. 11) brought it to a simple point: "*Creativity is thinking; it just happens to be thinking that leads to results that we think are great*" (cited according to Amabile, 1996a, p. 1 italics in the original). This statement fits well the above-mentioned definitions of ideas with respect to creativity. Even though we find

Simon's statement suitable in matters of our research, we will also introduce more elaborated definitions of creativity in the next paragraphs.

Creativity has been studied for more than half a century in various disciplines and from numerous points of view (Runco, 2004, p. 659). Yet, there is still no generally accepted definition of creativity that addresses all aspects of this multifaceted construct (Parkhurst, 1999, p. 1; Runco, 2004, p. 679f). For example, after criticizing the lack of a comprehensive definition, Parkhurst's (1999) defines creativity as

> *The ability or quality displayed when solving hitherto unsolved problems, when developing novel solutions to problems others have solved differently, or when developing original and novel (at least to the originator) products. (Parkhurst, 1999, p. 18)*

He attempted to provide a comprehensive definition of creativity that is broad enough and at the same time specific enough to account for all constituent parts of creativity but not more (Parkhurst, 1999, p. 18). While this definition includes many aspects of creativity it still misses others. For example, creativity is not only underlying problem solving (i.e., the reactive role of creating adaptations or solutions) but also problem finding (i.e., the proactive role of finding the problem in the first place) (Runco, 2004, p. 658f). Therefore, in a review on creativity research Hennessey and Amabile (2010, p. 571) call for the widespread adoption of a systems view on creativity. They state "[…] creativity arises through a system of interrelated forces operating at multiple levels, often requiring interdisciplinary investigation" (Hennessey & Amabile, 2010, p. 571).

Irrespective of creativity's multifacetedness, with respect to the generation of ideas creativity is commonly defined as the development of ideas that are both novel and useful (Goel, 2014, p. 1f; Kasof, 1995, p. 313; Mayer, 1999, p. 450; Paulus, 2000, p. 238; Sawyer, 2012, p. 8). For example, Amabile (1988) defined creativity as "[…] *the production of novel and useful ideas by an individual or small group of individuals working together*" (Amabile, 1988, p. 126 italics in the original). Within this definition, an idea can relate to diverse things including new products, services or processes (Amabile, 1988, p. 126). Similarly, Mumford and Gustafson (1988) stated that "[…] the ultimate concern in studies of creativity is the production of novel, socially valued products" (Mumford & Gustafson, 1988, p. 27).

According to the seminal work of Amabile (1996b, p. 35) creative tasks are rather heuristic than algorithmic. That is, a possibly applied process does not predetermine the results of creative tasks. Accordingly, Johnson-Laird (1988, p. 218) concludes that the products of creative processes exhibit three typical properties: (1) they are novel from the originators point of view, (2) they are the result of a nondeterministic process and thus reflect the originator's freedom of choice, and (3) specified criteria provide the options for making those choices.

With respect to the next chapter, we want to make a distinction between creativity and innovation. According to West (2003) creativity is concerned with the generation of ideas whereas innovation is concerned with the implementation of these ideas. Accordingly,

creativity can be defined as "[…] the early phases of idea generation, and innovation as the later phases of implementation" (Reiter-Palmon, Wigert, & Vreede, 2012, p. 296).

3.2 Innovation, Symbol Systems and Distributed Cognition

This section provides basic information about innovation, symbol systems and distributed cognition. Explaining each of the three topics in detail would go beyond the scope of this thesis. Therefore, we focus in only on those aspects that we deem relevant with respect to our research. As these aspects are related they are jointly explained in this section.

Innovation

Innovation is a discontinuous multistage process, with different activities and different individual behaviors necessary at each stage (Scott & Bruce, 1994, p. 582). The starting point of any innovation is a creative idea (Amabile, 1996b, p. 235; Boeddrich, 2004, p. 274) that addresses an innovation opportunity (Drucker, 2002). Over the course of the innovation process creative ideas are generated, realized and applied in order to solve a problem (Mayfield, 2011). Innovation is therefore also referred to as a knowledge-creation activity (Nonaka & Kenney, 1991; von Krogh et al., 2000).

With regard to innovation the extreme cases matter. That is "[…] an organization would prefer 99 bad ideas and 1 outstanding idea to 100 merely good ideas" (Girotra et al., 2010, p. 591). Yet, this one best idea only defines what the innovative product should be about. Developing new products or services is considered to be a complex task that requires the knowledge, skills and abilities of a diverse set of individuals who collaborate in a team (Hülsheger, Anderson, & Salgado, 2009, p. 1139). Over the course of the innovation process the creation of many ideas is necessary to solve emerging problems, re-define the problem and define how the innovation could be realized (Dougherty & Heller, 1994; Goel, 2014; Goh et al., 2013; Wiltschnig et al., 2013). Consequently, the complexity of problems in rapidly changing environments, including new mobile service development, requires the collaborative work of people with diverse perspectives, knowledge and skills (Hargadon & Bechky, 2006, p. 484).

Evolving an idea into a solution candidate is a dynamic process, in which teams engage in experimentation and validation cycles. In experimentation cycles, the teams are concerned with gaining knowledge about the problem and solution space of the project (Goh et al., 2013, p. 173). These activities are captured by terms such as "exploration" in management science (March, 1991, p. 71) or "divergent thinking" in creativity research (Guilford, 1959, p. 470). In validation cycles, the team is concerned with aligning their gained knowledge to the project requirements (Goh et al., 2013, p. 179). These activities are captured by terms such as "exploitation" in management science (March, 1991, p. 71) and "convergent thinking" in creativity research (Guilford, 1959, p. 470).

Symbol System

In the process of designing an innovative product or service team members communicate with one another and others stakeholder about ideas and thoughts via the exchange of verbal

utterances, written statements and/or visual representations. Thus, they use several symbol systems in order to externalize, share and align their mental models. They use natural language to explicate and discuss ideas and they apply sketching and prototyping methods to create external representations of their individual mental models. Sketches make it possible to create external representations of "[…] vague, inarticulate, imprecise, abstract, and ambiguous informational states" (Goel, 2014, p. 6). Hence, sketching is best used at "[…] the early ideation stages […] to play, explore, learn, and really try and gain a deep understanding of the undertaking" (Buxton, 2007, p. 139). Prototyping, on the other hand, gives a more precise idea of a possible solution (Davis, 1992; Gerber & Carroll, 2012; Yang, 2005). The actual prototype functions as an embodiment of design hypotheses, which can then be tested and further developed (Hartmann et al., 2006, p. 299; Yang, 2005, p. 649). Prototypes also facilitate communication and feedback between different stakeholders (Dow et al., 2011; Floyd, 1983; Folkestad & Gonzalez, 2010; Schrage, 2004) and help to make explicate the tacit assumptions of individuals or groups (Mascitelli, 2000, p. 187f).

As symbol systems are used to encode an individual's thoughts and ideas, they play a crucial role for the creation of a shared understanding in the design process of innovative mobile services. First, the structure of each symbol system inevitably imposes constraints on the possible encoding of information (Goel, 2014; Goodman & Elgin, 1988). Second, the vocabulary of each symbol system determines its expressibility. In some case a lack of vocabulary may "[…] merely make expression more cumbersome […]" (Evans & Levinson, 2009, p. 435), but in other cases (e.g., a language without numerals (Gordon, 2004)) "[…] it effectively limits expressibility […]" (Evans & Levinson, 2009, p. 435). Third, the use of a different representational system provides new ways to present ideas, and thus, may disclose previously hidden features (Goodman & Elgin, 1988, p. 19).

Distributed Cognition

In this respect, distributed cognition theory provides valuable explanations for why people work in groups and use external representations and artifacts during the process of design. The design of novel and useful mobile services is a cognitively demanding task, which makes both social and structural distribution of cognition relevant (Boland Jr & Tenkasi, 1995; Hansen & Lyytinen, 2009; Hollan, Hutchins, & Kirsh, 2000; Mangalaraj, Nerur, Mahapatra, & Price, 2014). Socially distributed cognition is the "[…] dynamic exchange and processing of information between two or more members of a group […]" (Mangalaraj et al., 2014, p. 250), which is necessary for collaborative work on interrelated task. Structurally distributed cognition is the "[interaction] with external representations" (Kirsh, 2010, p. 454) in assistance of an individual thinking and sense-making processes (Kirsh, 2010, p. 441). According to Kirsh (2010, pp. 441, 454) external representations not only boosts people's individual thinking but also let people share their thoughts with others (Kirsh, 2010, p. 454).

3.3 Project Teams and Meetings

This section provides basic information about groups, teams and meetings. Explaining each topic in detail would go beyond the scope of this thesis. Therefore, we focus only on those aspects that we deem relevant with respect to our research. As these aspects are related they are jointly explained in this section.

Project Teams

There are many everyday and scientific definitions for the concept of team. In addition, the labels *group* and *team* are often used interchangeably in the literature although they refer to related but different concepts (Guzzo & Dickson, 1996, p. 309; Katzenbach & Smith, 1993, p. 112; Powell, Piccoli, & Ives, 2004, p. 7). As there is a broad consensus that a team can be regarded as a form of group (cf. Guzzo & Dickson, 1996, p. 309) we first deal with the concept of a group before we proceed to the concept of a team.

A basic definition of groups is provided by McGrath (1984, p. 7) who defines a group as a social aggregate, in which the members are mutually aware of each other and have potentially also mutual interactions (cited according to Guzzo & Shea, 1992, p. 272). A similar definition is provided by Forsyth (2006, p. 3), who states that "[..] a group is defined as two or more individuals who are connected to one another by social relationships" (Forsyth, 2006, p. 3). Guzzo and Dickson (1996) provide a more specific definition for work groups based on the definitions of groups in organizations by Alderfer (1977, p. 230) and Hackman (1987, p. 322):

> *A "work group" is made up of individuals who see themselves and who are seen by others as a social entity, who are interdependent because of the tasks they perform as members of a group, who are embedded in one or more larger social systems (e.g., community, organization), and who perform tasks that affect others (such as customers or coworkers). (Guzzo & Dickson, 1996, p. 308f)*

According to this definition, a group consists of at least two individuals with task-related interdependencies, who see themselves and are seen by others as a social entity, which is embedded in a social system (Guzzo & Dickson, 1996, p. 308f).

Even though some researcher consider teams to be also included in this definition (e.g. Guzzo & Dickson, 1996, p. 309) others insist that a distinction should be made between groups and teams (cf. Powell et al., 2004, p. 7). For example, Katzenbach and Smith (1993, p. 113) state that while all teams are groups not all groups are teams. That is, teams exhibit in addition to the characteristics of groups a shared commitment to a goal, mutual dependencies with respect to the achievement of objectives as well as an individual and mutual accountability for the collective work results (Hackman, 2002, p. 249; Katzenbach & Smith, 1993, p. 112). Therefore, team members share leadership roles and engage during meetings in open-ended discussions and active problem-solving activities (Katzenbach & Smith, 1993, p. 113).

With the view that teams are groups (cf. Katzenbach & Smith, 1993, p. 112), we belief that the prevalent use of the term group in the literature for describing group-related phenomenon, including group dynamics, is still appropriate. In addition, as groups are complex, adaptive and dynamic systems (McGrath, 1997, pp. 14-16) so are teams (Ilgen, Hollenbeck, Johnson, & Jundt, 2005, p. 519). Teams exist within a context. They perform across time. Team members interact with each other and people in their context. Thereby, the team and its settings changes in complex ways (Ilgen et al., 2005, p. 519). Furthermore, typically a group is referred to as a team in the context of sports or work activities, in which team members

have applied functions (e.g., software development) and assumed roles (e.g., software developer) that are related to these functions (Levi, 2010, p. 4). In a review on teams in organizations Ilgen et al. (2005) identified several excellent theoretical models of teams. They concluded based on the underlying notion, which is reflected in theses theoretical models, that

> *[…] teams are complex, dynamic systems, existing in larger systemic contexts of people, tasks, technologies, and settings. (Ilgen et al., 2005, p. 519)*

Similar as a team is a more specific instance of a group, a project team is a more specific instance of a team. The main differences are that a project team exists only for a limited time and produces during this period a one-time result (Cohen & Bailey, 1997, p. 242). An example of a project team is a new product development team. According to Hackman (2002) such a team has usually a "[…] clear and engaging direction, and perform whole pieces of work for which they are relatively autonomous and about which they receive direct feedback (i.e., the product is created and works, or it isn't and doesn't)" (Hackman, 2002, p. 257). As a project team creates something new its team members are inevitably faced with "[u]ncertainty, learning, invention and change […]" (Gersick & Davis-Sacks, 1990, p. 146).

The research in this thesis is focused specifically on project teams. Members of project teams are brought together to do a specific project in a limited amount of time. Thereby, they often face non-routine tasks and work for the time of the project with a new mix of people. In addition, members of project teams often are members of multiple teams at the same time or they have to conduct routine tasks of their department's day-to-day business, and thus, they have to make decisions on the coordination of the team members' efforts. Moreover, as project teams face non-routine tasks they have to make decisions regarding the actions intended to solve the assigned problem as well as the distribution and execution of the respective activities (Deeter-Schmelz, Kennedy, & Ramsey, 2002, p. 117).

Team Meeting

In general, a meeting can be described as any activity that is performed by a group of people that takes place either simultaneously or asynchronously at the same place or at different places (Nunamaker et al., 1991, p. 41). A further specification of this definition is the view that a meeting is "[…] a goal or outcome directed interaction between two or more people […]" (Bostrom, Anson, & Clawson, 1993, p. 148). In addition, Schwartzman (1989) emphasizes "[t]he importance of meetings as sense-making and social and cultural-validating forms for individuals and communities […] (Schwartzman, 1989, p. 311).

As this research focuses on face-to-face interactions among individuals in team meetings, the aspects of place and time independence (cf. Bostrom et al., 1993, p. 148; Nunamaker et al., 1991, p. 41) is less important. Yet, the view that meetings are goal directed, intended to produce an outcome (cf.Bostrom et al., 1993, p. 148) and used for making sense and social validation (cf. Schwartzman, 1989, p. 311) is highly relevant in matters of our research on idea inclusion in team meetings.

As mentioned above, project teams work on highly interdependent tasks and due to non-routine activities and the creation of one-time outputs the coordination and alignment of goals

and activities is crucial. Team meetings provide an environment for those tasks. In addition, meetings constitute decisive situations in the course of a project as they are used to generate ideas, discuss and make decisions (Kauffeld & Lehmann-Willenbrock, 2012, p. 131).

Even though meetings are a common part of employees' and managers' work, many meetings are perceived to be of a poor quality (Kauffeld & Lehmann-Willenbrock, 2012, p. 131). One possible reason for this is suggested by Kauffeld and Lehmann-Willenbrock's (2012, p. 148) finding that dysfunctional communication had a stronger impact on a team's evaluation of meeting success compared to functional communication.

Beneficial or detrimental interaction behaviors in a team meeting influence the meeting's success in terms of participant's meeting satisfaction, team productivity and organizational success (Kauffeld & Lehmann-Willenbrock, 2012). Although West (2012) states that "[p]oor meetings are better than no meetings at all […]" (West, 2012, p. 122), meetings that are well conducted can elicit a team's belief in its own success and strengthen effective teamwork regarding the achievement of a shared goal (West, 2012, p. 122).

With regard to an innovation team's work on a creative task it is suggested that extensive training would increase the team's effectiveness (Paulus et al., 2012, p. 343). Yet, even though there has been a considerable amount of research on team training and its benefits on performance, in general, only few studies exist with respect to team training on innovation (Paulus et al., 2012, p. 343). For example, a study by Stempfle and Badke-Schaub (2002) on thinking processes in design teams identified a superior and an inferior process with respect to the collaborative design of a creative solution (Stempfle & Badke-Schaub, 2002, pp. 488-492). They conclude that designers need to learn reflective strategies and thinking processes by own experiences (Stempfle & Badke-Schaub, 2002, p. 495f). Another example suggesting that training is beneficial to creativity in teams, is Baruah and Paulus' (2008) study on brainstorming in groups. Their findings suggest that training can increase the quality and quantity of ideas generated by groups in brainstorming sessions (Baruah & Paulus, 2008, p. 536).

3.4 Group Dynamics

In this section we provide a brief overview of research on group dynamics. Even though the research in this thesis is focused specifically on project teams, group dynamics are important, because a team is only a special type of group.

The term *group dynamics* dates back to the research by Lewin (e.g.1944:, 1947 #1482). Group dynamics refers to both the scientific study of groups and the dynamics (i.e., actions, processes and changes) that occur in social groups (Forsyth, 2006, p. 16). In this thesis we use the term group dynamics only in matters of the processes, in which "[…] groups and individuals act and react to changing circumstances […]" (Forsyth, 2006, p. 16).

According to Lewin (1947) items such as group structures or social forces are mere "[…] popular metaphor or analogy which should be eliminated from science as much as possible" (Lewin, 1947, p. 10). In his opinion, it is more important to understand the dynamics of groups based on "[…] insights into the desire for and resistance to, specific change" (Lewin,

1947, p. 14). In this respect, group dynamics is intended to describe all aspects of a group and sees group dynamics as relevant for understanding social life (Lewin, 1944, p. 195).

With respect to change in groups, for example to a new level of performance, Lewin (1947) identified three basic aspects: (1) unfreezing, (2) moving, and (3) freezing. The first aspect refers to the group getting ready for a change. The second aspect refers to the actual change (i.e., moving to a new performance level). Finally, the third aspect refers the group staying at the new performance level. This three-step process of change in groups is, for example, found to parallel the process of change in viewpoints with respect to organizational change (Isabella, 1990, p. 26f).

With the study of group dynamics the level of analysis in sociology and psychology expanded from the sole focus on individual-level analysis to group-level analysis (Forsyth, 2006, p. 18). The analysis of social groups at the individual level tries to explain social behavior on the basis of the individual behaviors of each group member (Steiner, 1974, p. 95f). The analysis of social groups at the group level perceives the individual as part of a lager system (e.g., a group or society). Thereby, causes are located outside the individual and an individual's behavior reflects the events and states of the lager system (Steiner, 1974, p. 96).

Research on group dynamics has become an interdisciplinary field that addresses various phenomena related to groups, group processes, group performance and capabilities, group development, and the influence of groups on individuals and society (Forsyth, 2006, pp. 17-25). Examples of group dynamics are the rejection of a particular member of a group or a group's resistance to change triggered by the deviant behavior of one of its memebers (Pinto, Marques, Levine, & Abrams, 2010, p. 117). Another example for group dynamics is Tuchman's (1965) model of small group development, which theorizes about the stages necessary to form a functionating group (Bonebright, 2010, p. 113). During each stage different dynamics affect the group and its capability to work effectively together.

Overall, research on group dynamics is concerned with the study of the forces and their relation that influence the behavior of people in groups. With people living, working and playing in groups (Poole, Hollingshead, McGrath, Moreland, & Rohrbaugh, 2004, p. 3) the occuring dynamics have been implicitly and explicitly studied in a wide variety of diciplines (cf. Poole et al., 2004).

3.5 Summary

In this chapter, we develop the conceptual foundation for this thesis. The intention of this chapter is not to provide a thorough overview of the current state of scientific research with respect to the described topics, but to introduce concepts that are less known in IS research. Therefore, we define in this chapter important terms based on scientific literature and expose our understanding of concepts that are important in this thesis.

4. Literature Review

According to a proverb *if we want to see further than others we have to stand on the shoulders of giants*. Therefore, this chapter provides information about what has been done before and identifies gaps in the current scientific knowledge. With respect to the thesis' object of investigation we focus our review on small groups and teams. Thereby we put a special focus on research in relation to design and creative work. As groups and teams are social systems we consider also theories regarding social influences. The aim of this chapter is to answer our first research question:

RQ1 What is the state of scientific knowledge regarding social influences and small group research in relation to creative work?

The remainder of this chapter is organized as follows. First, we state the purpose, method and scope of our literature review. Second, we introduce the central aspects of social influences on individuals and groups. Third, we provide an overview of existing research on small groups with respect to creative work in groups. Finally, we state the research gap addressed in this work and explain the originality of this thesis.

4.1 Approach and Scope

The review of literature is a disputed topic among grounded theory scholars. Glaser und Strauss (1967, p. 37) suggested initially the strategy to postpone the literature review until after the completion of the analysis to avoid that established theories have an effect on the emergent theory of the research conducted. This perception is also supported by research on creative cognition, which found that prior knowledge could have constraining effects on creative endeavors (Smith, 2003). For example, the exposure to previously proposed solutions can lead to cognitive blocks that inhibit finding a more suitable solution to a problem (Smith, 2003, p. 16). However, Smith (2003, p. 29) also notes that this does not mean that people have to reject prior knowledge by default. Important discoveries are commonly based on previous knowledge (Smith, 2003, p. 29). A similar stance is nowadays prevalent among grounded theorists. As researcher are inevitably exposed to extant ideas in their respective field (Thornberg, 2012, p. 244) a critical and reflective stance to theories and known facts is more beneficial (Thornberg, 2012, p. 249).

For our review of the literature, we followed Charmaz's (2014, p. 307f) advice and started with a scanty review of the literature on small groups and teams with respect to creative work, including design. We successively enhanced our review over the course of our study as emerging categories led us to new substantive areas. This approach is common for studies that rely on theory-building methods that recommend the iteration between theory and data (cf. Harrison & Rouse, 2015, p. 377; Pratt, Rockmann, & Kaufmann, 2006, p. 236). We also adhered to Charmaz's (2014, p. 307) remark with regard to writing a research report and tailored our review to fit the specific purpose and argument of this thesis. However this does not mean that we tried to get rid of crucial but competing or conflicting ideas. We focused our literature on the significant works, which are related to the findings of our inductive study, in order to provide a thorough and sharply focused (Charmaz, 2014, p. 308) account of the current knowledge.

The scope of our literature review is defined by the general goal of the thesis. As groups and teams are complex, adaptive and dynamic systems (Ilgen et al., 2005, p. 519; McGrath, 1997, pp. 14-16), we take also theories on social influences on individuals and groups into account. With respect to the specific focus of our research study on collaborative work in teams that tackle an open-ended task, which requires creativity, we focus our review especially on research on small groups and teams in relation to creativity.

Both research on teams and small groups as well as research on creativity have a long history and have been studied in various academic disciplines, including but not limited to psychology, sociology, communication, education as well as computer and information science (Kozbelt, 2011, p. 473; Poole et al., 2004, p. 3f). This makes is necessary to integrate knowledge that is scattered across several disciplines. Going across disciplines is also recommended for grounded theory studies (Charmaz, 2014, p. 308). With research on these topics having such a long tradition, attempts have already been made to integrate this scattered literature. Therefore, we also look at previous reviews, which provide a general overview regarding research on small groups and teams.

4.2 Social Influences on Individuals and Groups

Social Comparison Theory

According to the seminal theoretical considerations by Festinger (1954) social influence processes are the consequence of the socio-psychological process that arises from a human's "[…] drive for self evaluation and the necessity for such evaluation being based on comparison with other persons" (Festinger, 1954, p. 138). That is, in absents of objective evaluation criteria people evaluate their own abilities and opinions with respect to those of similar individuals and try to change accordingly (Festinger, 1954, p. 118). The basic principles of this theory are supported by a wide variety of research findings (Mumford, 1983, p. 874).

Social comparison is, for example, used as an underlying theory to explain effects with respect to decisions for the adoption, abandonment or change of an organization's strategy (Greve, 1995, p. 471). In the presence of uncertainty people use social comparison as a proxy of required but unavailable information about the value or risk of a decision (Greve, 1995). An example with respect to innovation would be a decision about the adoption of an innovation idea, which entails risk because the balance of cost and benefit is uncertain. According to Burt (1987) people manage this uncertainty "[…] by drawing on others to define a socially acceptable interpretation of the risk" (Burt, 1987, p. 1288). In addition, social comparison has been shown to affect an individual's performance at group brainstormings. For example, findings from a laboratory experiment by Leggett Dugosh and Paulus (2005) suggest that social comparison affects the number of ideas generated by an individual. Overall, Paulus (2000, p. 242) states that individuals in groups are inclined to compare their own performance with the performance of other members of the group.

Social Influence Theory

The study of social influence is concerned with an individual's susceptibility to influences from outside (Cialdini & Goldstein, 2004, p. 591). Kelman (1958, p. 52f) developed a theoretical framework for the study of social influence on the basis of communication research. According to Kelman (1958, p. 52) social influence produces a change in an individual's attitudes and actions through an individual's accepting or complying to the influence. He distinguishes between three different processes that are underlying social influence: (1) compliance, (2) identification, and (3) internalization (see also Kelman, 2006, p. 5).

First, compliance refers to an individual's acceptance of a social influence because of his or her hope to receive a reaction from another individual or a group, which he or she deems favorable (Kelman, 1958, p. 53). The individual complies with the influence either to attain a reward or to avoid a punishment over which the influencing individual or group has control (Kelman, 1961, p. 62).

Second, identification refers to an individual's acceptance of a social influence because of his or her desire to "[…] establish or maintain a satisfying self-defining relationship [to another individual or a group]" (Kelman, 1958, p. 53). Thereby, a self-defining relationship is a "[…] role relationship that forms a part of the person's self-image" (Kelman, 1961, p. 63).

Third, internalization refers to an individual's acceptance of a social influence because he or she perceives the encouraged behavior (i.e., the constituting ideas and actions) as "[…] intrinsically rewarding" (Kelman, 1958, p. 53), i.e., the behavior is adopted because it is congruent with the individual's own value system (Kelman, 1958, p. 53). With respect to internalization the content-related credibility of the individual or group inducing the behavior is vital (Kelman, 1961, p. 65).

In relation to our study, Kelman's (1958, 1961; Kelman, 2006) fundamental theoretical framework on social influence along with the extensive body of scientific knowledge of the social influence literature (see, for example, Cialdini & Goldstein, 2004) provides a comprehensive basis of possible explanation and interpretations for our findings. A description of all relevant aspects and research findings regarding social influence, including but not limited to research on resistance, authority and obedience, reciprocation or perceived consensus, is beyond the scope of this work. Therefore, only if relevant, will we consider those research findings in the discussion of our findings.

4.3 Small Group Research regarding Creative Work in Groups

With regard to creative work in organizations social factors play an important role (e.g. Amabile & Pillemer, 2012; Caldwell & O'Reilly, 2003). According to Glăveanu and Lubart (2014), social interactions play "[…] a key formative, regulatory, motivational and informational role in relation to creative work" (Glăveanu & Lubart, 2014, p. 29). Thereby, ideas are often seen as the products of individual minds (Singh & Fleming, 2010, p. 41). Yet, research suggests that organizational creativity is a "[…] function of individual characteristics (e.g., abilities and knowledge), group characteristics (e.g., norms, cohesion, and diversity),

and organizational characteristics (e.g., culture, resources)" (Paulus, 2000, p. 239). An individual's characteristics, including knowledge and abilities, are input factors to creative endeavors and influence the creative performance (Paulus, 2000, p. 239; Woodman et al., 1993, p. 301). As individuals are embedded in social systems (i.e., groups or teams), which in turn are embedded in larger social systems (e.g., an organization) (Alderfer & Smith, 1982, p. 38) the creative work is affected by social influences (Woodman et al., 1993, p. 301). The social and contextual influences become even more apparent when individuals work collaboratively in a group. Research found that group characteristics such as diversity, size, or the roles of individuals in the group influence a group's creative behavior and thus the creativity of the outcome (Paulus, 2000, p. 239; Woodman et al., 1993, p. 304). In the following paragraphs, we focus on group and team creativity in relation to the topic of the thesis.

Groups and teams have been studied for more than 60 years in a variety of disciplines (Ilgen et al., 2005, p. 518; Poole et al., 2004, p. 3f). Research on creative work in group research has led to mixed findings. For example, according to a literature review on group creativity by Sawyer (2012, p. 231f), the majority of research suggests that groups are less creative than individuals. As examples, he cites the work of Lencioni (2002) regarding dysfunctional groups and Janis (1972) regarding groupthink. However, he also states that there is some support "[…] for the belief that groups are more creative than individuals" (Sawyer, 2012, p. 232). As examples, Sawyer (2012, p. 232) cites the work of Larey and Paulus (1999) and Taylor, Berry and Block (1958). Another example, which supports the belief that groups are more creative than individuals, is the study by Wuchty, Jones and Uzzi (2007). In this study, they investigated a huge database of scientific papers and patents over the time span of 50 years and found that collaborative work leads to better outcomes (Sawyer, 2012, p. 232).

For a while managers viewed teams as proper solution to many organizational issues irrespective of possible contradictory evidence (Sinclair, 1992, p. 611f) and teams are still widely regarded as necessary to tackle the complex societal, scientific and technical challenges (Paulus et al., 2012, p. 327) faced by business. For example, teams are still prevalent in organizations, for addressing complex, open-ended and only vaguely defined objectives like the early phases of innovation (Goh et al., 2013, p. 160; Møller & Tollestrup, 2013, p. 3). This is not surprising because teams offer more diverse skills and knowledge, a more flexible application of these resources and are able to continue working even in the absence of individual members (Hackman, 2002, p. 245f). Moreover, a well-functioning team can achieve synergetic effects that enable the team members to achieve as a collective an objective that no individual member could have achieved (Hackman, 2002, p. 246).

Yet, research findings suggest that teams do not work equally well in each setting and for each task (e.g. Hackman, 2002; Sinclair, 1992). Research on team creativity has lead to mixed findings with regard to advantageous and disadvantageous factors on group creativity (Paulus et al., 2012, p. 348; Reiter-Palmon et al., 2012, p. 300). For example, studies on idea generation in groups (e.g. Diehl & Stroebe, 1987, 1991; Girotra et al., 2010; Kohn & Smith, 2011) suggest that individuals who work collaboratively on an idea generation task are less creative compared to individuals or nominal groups, i.e., individuals that work alone but whose final results are combined as if they had worked as a group. What Diehl & Stroebe (1987, 1991) concluded based on their studies is "[…] that group sessions should not be used

to generate ideas" (Diehl & Stroebe, 1991, p. 402). Girotra, Terwiesch and Ulrich suggest that groups "[…] do poorly in absolute terms in selecting the best ideas" (Girotra et al., 2010, p. 602). There are often tendencies to select the most useful and practical ideas instead of the most innovative (i.e., novel) ones (Mueller, Melwani, & Goncalo, 2012, p. 17; Paulus et al., 2012, p. 349). On the other hand, a research summary by Paulus, Dzindolet and Kohn (2012) concludes that "[…] with the right people, the right supporting, motivational and task contexts, and effective social and cognitive processes, teams can be highly innovative" (Paulus et al., 2012, p. 348). That is, disadvantageous factors in one setting might exhibit a benefit in another setting. Moreover, individual factors occur on a continuum and require a certain balance to be most effective (Paulus et al., 2012, p. 348). For example, in a meta-analysis on the effect of task and relationship conflict De Dreu and Weingart (2003, p. 748) found that both factors compromise team performance but still may lead to positive consequences in specific situations. With regard to innovation, a certain level of conflict is found to be stimulating (Dyer & Song, 1998, p. 505). Yet, research suggests that only a moderate level of task-related conflict facilitates innovation but that this does not apply to relationship conflicts (De Dreu, 2006, p. 83).

Theory of Groups

The seminal research by McGrath (1984, 1991) provides a solid bases for the research on small groups and teams. McGrath's (1984, p. 12ff) conceptual framework for the study of groups comprises six main classes of variables and their complex hypothesized interrelation. The six main classes are: (1) the group interaction processes, i.e., the interation that takes place between the members of a group, (2) the individual properties of the group members, e.g., the traits, knowledge, gender and other charactersitics of each single member of a group, (3) the group structure, e.g., the size and maturity of the group, (4) the properties of the environment, i.e., physical and social aspects of the environment in which the group interation takes place, (5) the task and situational inputs, e.g., the assumed goal that the group wants to achieve and the tasks assigned to its members for achieving the goal, and (6) the behavior setting of group and task, i.e., the pattern with respect to communication, task performance and interpersonal relationships resulting from the interactions among a group's members (McGrath, 1984, pp. 12-17). In addition, McGrath's (1991) theory of groups (i.e., theory of time, interaction, and performance or in short form, the TIP theory) draws a comprehensive theoretical picture of group structure and group interaction in relation to task performance.

A detailed examination of all twelve elements of TIP theory is beyond the scope of this work. We only want to stress the main points relevant to this thesis. First, groups are complex social systems that address multiple functions with regard to production (i.e., task-related activities), the group's well-being and the group's members (McGrath, 1991, pp. 151, 154). Second, all group action can be described as one of four modes of group activity for which the modes describe optional rather than mandatory forms of activity (McGrath, 1991, pp. 152f, 154). The modes are directed to (1) goal choice, (2) means choice, (3) policy choice and (4) goal attainment (McGrath, 1991, p. 152f). These are a number of alternative types of activity, which the group may perform, rather than a fixed process, which the group runs through (McGrath, 1991, p. 157f). Thereby, the versatile interrelation of functions, modes and the path for transitions between the modes may provide alternative explanations for phenomena in groups that bring about process loss (McGrath, 1991, p. 160). Third, TIP theory emphasizes

temporal influences on the behavior of groups (McGrath, 1991, pp. 161-165) and influences regarding the group interaction process (McGrath, 1991, pp. 165-169). All these aspects provide valuable starting points for the interpretation of observed phenomena in working teams.

Model of Collaborative Creativity

Paulus and Dzindolet (2008) and Paulus, Dzindolet and Kohn (2012) provide a comprehensive overview of influences and processes involved in collaborative creative work. Figure 1 represents the model of collaborative creativity developed by Paulus and Dzindolet (2008) and adopted by Paulus, Dzindolet and Kohn (2012).

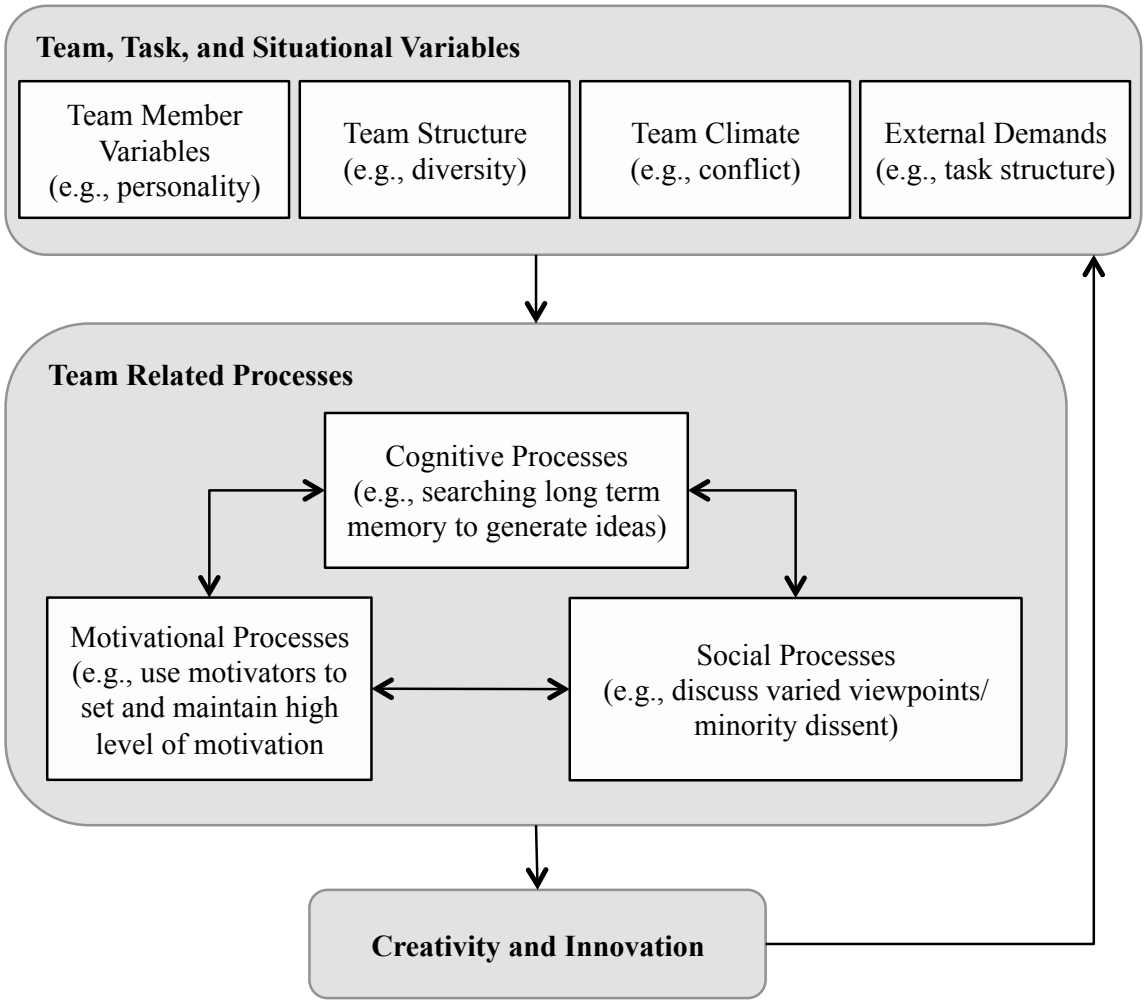

Figure 1. A model of influences and processes involved in collaborative creative work (Source: Based on Paulus and Dzindolet (2008, p. 230) and Paulus, Dzindolet and Kohn (2012, p. 331))

According to their model, team, task and situational variables influence the team related cognitive, motivational and social processes that are involved in the development of a creative output. The creative output may in turn modify the team, task and situational variables (Paulus & Dzindolet, 2008, p. 229). A detailed description of all aspects of the model is

beyond the scope of this work. Therefore, we refer the reader to Paulus and Dzindolet (2008) and Paulus, Dzindolet and Kohn (2012) for a comprehensive explanation of the model and its variables.

What Hurts Creative Work in Team?

Research on group brainstorming suggests that the performance of group work is inferior to a hybrid work structure, in which an individual work phase is followed by a group work phase (Girotra et al., 2010, p. 602). Although it is found that group members build more on previous ideas of other group members (Girotra et al., 2010, p. 601), which is widely seen as a core benefit of group brainstorming (e.g. Baruah & Paulus, 2008, p. 524; Dennis & Williams, 2003, p. 163; Osborn, 2008, p. 53), it was found that this did not increase the quality of the ideas (Girotra et al., 2010, p. 601). In addition, other studies show that the exposure to ideas of others during brainstorming leads to fixation effects in terms of conformity (Kohn & Smith, 2011, p. 359), which leads to a reduced variety and novelty of ideas (Kohn & Smith, 2011, p. 369). Other research suggests that the conformity effect occurs unintentionally and is not limited to the generation of ideas in a group (Smith, Ward, & Schumacher, 1993, p. 837). It is rather a general cognitive effect that could be caused, for example, by the exposure to explicitly stated examples prior to an idea generation task (Smith et al., 1993, p. 844) or as a result of implicitly included cues of the problem statement (Smith, 1995, p. 140f). Yet, the priming effect of examples or other ideas must not inevitably lead to a reduced creativity of the result (Marsh, Landau, & Hicks, 1996, p. 677). In addition, new ideas are always built on previously stored information and knowledge (Ward, 1995, p. 157f).

Another factor that hurts creative work in groups is production blocking (Paulus, Putman, Dugosh, Dzindolet, & Coskun, 2002, p. 303f). During the time when one group member is speaking others are listening and thus cannot express their ideas. Yet, the productivity loss is not caused by a lack of available speaking time (Diehl & Stroebe, 1987, p. 498), the reevaluation of ideas in the face of other team members' ideas or due to forgetting ideas (Diehl & Stroebe, 1987, p. 508). It is suggested that production blocking is the result of preventing the development of new ideas during the waiting time until the current idea can be expressed (Diehl & Stroebe, 1987, p. 508). While blocking effects are inevitable in face-to-face meetings, possible countermeasures would be writing, note taking or the use of computers to support the creative work (Paulus et al., 2012, p. 332). Several studies suggest that computers enhance problem-solving in groups and facilitate the collaborative work on design tasks (e.g. Forster, Frieß, Brocco, & Groh, 2010; Lu & Mantei, 1991; Mercier & Higgins, 2014; Shneiderman, 2007). Discussions regarding the analysis and evaluation of ideas, however, are still important tasks in addition to the generation of ideas in design meetings (Stempfle & Badke-Schaub, 2002, p. 491ff).

With regard to team composition and diversity, a recent literature review concluded that research findings are conflicting (Reiter-Palmon et al., 2012, p. 300). Yet, with regard to demographic diversity much of research suggests that it negatively affects team performance and team creativity (Reiter-Palmon et al., 2012, p. 297). These effects, however, are weakened over time as the team works together (Harrison, Price, & Bell, 1998, p. 96; Harrison, Price, Gavin, & Florey, 2002, p. 1029). Functional diversity, on the other hand, is found to positively influence creative work and innovation (Hülsheger et al., 2009, p. 1137;

Reiter-Palmon et al., 2012, p. 298). However, the diverse knowledge of team members in relation to their functional diversity can also have detrimental effects if the level of diversity becomes too high and thus accessing, exploring and linking the information becomes too difficult (Dahlin, Weingart, & Hinds, 2005, p. 1119). In addition, research suggests that teams concentrate on shared information instead of unique information (Stasser & Birchmeier, 2003), which may diminish the positive effect of a team's broad collective knowledge base (Paulus, 2008, p. 172). This effect is also called hidden profile phenomenon (West, 2012, p. 127).

Further factors that may hamper the performance of creative teams are variance in communication skills, the domination by particular team members, egocentric members or status and hierarchy (West, 2012, p. 127). First, effective communication and the exchange of information are essential to innovation (Paulus, 2000, p. 200; Paulus et al., 2012, p. 342). Research findings suggest that effective communication is positively related to innovation (Ancona & Caldwell, 1992, p. 321; Hülsheger et al., 2009, p. 1128). A lack of communication skills may impede a team member's possibility to propose his or her ideas while more rhetorically skilled team members may exert an inopportune influence on the team (West, 2012, p. 127). Second, dominant and egocentric members may exert a disproportionate influence on team decisions (West, 2012, p. 127). The dominating and controlling behaviors of extraverted team members may interfere with the team's collaborative idea generation and elaboration, and thus, may reduce the creativity of the final outcome (Baer, Oldham, Jacobsohn, & Hollingshead, 2008, p. 274). Finally, status and hierarchy can lead to similar imbalances in a team as well as the aforementioned factors. Stable hierarchical structures in teams, which are not related to the situation-dependent specific knowledge and expertise, can also impede team creativity (Aime, Humphrey, DeRue, & Paul, 2014, p. 327).

Finally, the influences of time are manifold (Arrow, Poole, Henry, Wheelan, & Moreland, 2004, p. 73f) and sometimes they also prejudice creative work in teams. For example, a study of time-related effects on a creative generative task found that limiting the time available for solving a task hampered an individual person's creativity (Moreau & Dahl, 2005, p. 21). Influences of time on teams have been studied amongst others in terms of time as socially constructed (Arrow et al., 2004, p. 73). For example, Waller et al. (2001) highlight the necessity of considering each team members individual perception of time because this influences how the team as a whole performs under time constraints (Waller et al., 2001, p. 596). In addition, they identified four different types of team members with respect to their perception of time depending on whether they are future or present oriented and exhibit high or low time urgency (Waller et al., 2001, p. 592). Thereby, team members' different perceptions of time are possible sources of misunderstandings and conflict (Waller et al., 2001, p. 591).

What Facilitates Creative Work in Team?

Yet, with respect to the elaboration of ideas, research findings suggest that collaboration improves the quality of an idea (e.g. Blohm, Bretschneider, Leimeister, & Krcmar, 2011, p. 117). In addition, research findings that suggest a benefit of groups over individuals conclude that groups can outperform individuals as well as nominal groups in creative tasks when they apply, for example, brainwriting as a more suitable strategy for cooperation instead of verbal

brainstorming (e.g. Paulus & Yang, 2000). Moreover, research findings suggest that computer supported collaborative work can reduce some of the detrimental effects of working in groups. For example, research suggests that the use of an electronic brainstorming system can reduce production blocking and cognitive inference during collaborative idea generation (Dennis & Williams, 2003, p. 173). In addition, information and communication technologies have enabled new forms of collaboration in teams that affect profoundly how people work and collaborate. It is used to support and enhance the performance of face-to-face meetings (Nunamaker et al., 1991, p. 43) and to enable people to work collaboratively together across temporal, spatial and organizational boundaries (Powell et al., 2004, p. 7). Furthermore, research findings in social and behavioral science suggest favorable interaction processes for successful direct interactions of team members in meetings (e.g. Kauffeld & Lehmann-Willenbrock, 2012). These known strategies that improve meetings serve as a valuable input for the discussion of the behaviors that lead to idea inclusion or exclusion in our study.

4.4 Research Gap and Originality of this Thesis

Research on teams and small groups has a long tradition and has been conducted in various academic disciplines, including psychology, sociology and management as well as computer and information science, leading to a large knowledge base (cf. Hollingshead & Poole, 2004; Poole et al., 2004). Nonetheless, there are still fruitful avenues for further research.

Research on innovation and creativity in teams adopted and applied predominantly the lens of an input-process-output model (cf. Hackman, 1987; McGrath, 1984) that was originally developed and used for research on team performance (Goh et al., 2013, p. 161; Ilgen et al., 2005, p. 519). In this context, the influence of various inputs on the output was mainly studied. Although an increasing amount of research has studied the processes that affect an innovation outcome there are still unanswered questions. Most studies do not capture the dynamic nature of the processes but rather measure them at a single point in time or survey a team's perception of the overall process (Goh et al., 2013, p. 162).

In addition, effects of input and/or process on creative work in groups and teams are mostly studied with regard to idea generation. These studies use predominately group brainstorming sessions (e.g. Baruah & Paulus, 2008; Dennis & Williams, 2003; Diehl & Stroebe, 1987; Girotra et al., 2010; Mullen et al., 1991; Paulus et al., 2002) to assess the effect of input variable (e.g., team composition) and/or the process variable (e.g., sequence of individual and group work) on the output (e.g., number of generated ideas or number of unique ideas). Studies that take interactions between team members (e.g., beneficial and detrimental interaction behaviors) into account focus mainly on communication acts and analyze the data by applying a specific coding schema (e.g. Kauffeld & Lehmann-Willenbrock, 2012).

Although some studies used observational methods, including ethnography or interaction analysis, for their investigation of teams (e.g. Tang & Leifer, 1991; van Osch & Mendelson, 2011), laboratory experiments still dominate (McGrath, 1997, p. 15; Paulus et al., 2012, pp. 328, 348). Paulus, Dzindolet and Kohn (2012, p. 328) highlight the benefits of laboratory experiments (e.g., controlled conditions) and refer to studies that suggest the applicability of the findings to real-world work teams. However, the criticism of laboratory experiments raised by McGrath (1997, p. 15) regarding small group research and by Sears (1986, p. 516)

regarding social science studies, in general, are more relevant in relation to the subject of this study. The ad hoc manner, short duration and one-time interactions of strangers, who are set up as a team, does not do justice to the reality of teams (McGrath, 1997, p. 15f). Researchers, who study teams for a longer duration, mostly focus on the question of how input variables affect the creative output of a team (e.g. Schilpzand, Herold, & Shalley, 2011) or use survey research and interviews for their data collection (e.g. Hey, Joyce, & Beckman, 2007).

Where does this work fit in?

This thesis examines a video collection of meetings of three teams over the course of five weeks in order to investigate the dynamic interaction within the teams that shape the design of their proposed solution. Using grounded theory and ethnographic observations the inclusion or exclusion of each team member's suggestions is examined in relation to why this inclusion or exclusion occurred. Overall, we generated hypotheses on the evolution of a team's assigned design problem to gain a more nuanced understanding of group dynamics that affect the inclusion of ideas during work meetings.

This thesis investigates, in-depth, the mechanisms that affect the inclusion of ideas in team meetings. This is important because the final product of a team is a composition of the individual team member's ideas that are created and included during the elaboration of an initial idea into a proposed solution. Usually much effort is put into the generation and selection of the best idea for a new product as the starting point of an innovation project (cf. Blohm, 2013; Dean, Hender, Rodgers, & Santanen, 2006; Girotra et al., 2010; Riedl, Blohm, Leimeister, & Krcmar, 2010). However, during the elaboration and advancement of an initial idea into a proposed solution, the team has to solve different problems and gain additional knowledge that might alter the initial idea in important ways. For example, one team member identifies the necessity to design an additional feature based on information gained from a potential user's description of his or her problem. Those ideas receive much less formal evaluation but are included or excluded based on the team's autonomous decisions or after consulting with the project manager. In both cases, the decision is made in a meeting and it might seriously affect the final design in a positive or negative way.

Although we study teams that work on creative tasks, we do not judge the creativity of the proposed ideas but only look at what happens to them. We decided to do so for the following reasons. First, creativity is difficult to assess in absolute terms. Creativity is commonly defined in terms of novelty and usefulness (e.g. Amabile, 1996b, p. 35; Kasof, 1995, p. 313; Mayer, 1999, p. 450; Mumford & Gustafson, 1988, p. 28). Both dimensions are dependent on an individual's or a community's perception. For example, Lyytinen and Rose (2003, p. 559) argue that with regard to innovation it is not important whether an idea or artifact is new to the world but only whether it is perceived as new by the organization adopting it. Therefore, the participants would have to assess the creativity of an idea. Second, the creativity of the individual ideas is not crucial for the study of idea inclusion or exclusion. Ideas might even be excluded because of their creativity (cf. Mueller et al., 2012). In addition, the group dynamics that cause the exclusion of an idea might not be dependent on a rational reason for its exclusion.

Overall, to the best of our knowledge and exhaustive literature search, the use of ethnographic observations and interaction analysis in combination with the application of grounded theory methods for the investigation of those dynamics that lead to idea inclusion in teams has not been done before.

5. Research Approach

This chapter describes the methods applied, the setting of our research, the study conducted as well as the data collected and the types of analyses carried out. In short, this chapter describes research carried out to answer our second and third research questions.

The remainder of this chapter is organized as follows. First, we describe the methods applied. Second, we provide information about the setting of this research. Third, we describe the case investigated and provide information about the data collected. Finally, we explain our approach to the analysis of the data.

5.1 Methods

This section describes the methods applied in our empirical study on idea inclusion and exclusion. Overall, this thesis applies the methods of a constructivist grounded theory approach (Charmaz, 2014) to investigate process and behavioral factors that lead to idea inclusion or exclusion in project teams (see also chapter 2). Thereby, an important step is to gather rich data (Charmaz, 2014, p. 22). Often researchers use interviews to obtain the required information from the study participants' point of view. Interviews, however, are not the only means to obtain information. In the end, the aim and questions of the research should determine the appropriate data collection method (Charmaz, 2014, p. 27). In this study, we applied a combination of ethnographic methods and interaction analysis (Suchman & Trigg, 1991, p. 75). Ethnographic methods are tools for gathering rich data through participant observation, analysis of documents and questionnaires (Charmaz, 2014, pp. 22,35). In addition, we used video data to capture the richness of interaction in team meetings (see also chapter 2.4 for the comprehensive rational for why we use videos instead of interviews); video technology is an essential tool for interaction analysis (Jordan & Henderson, 1995, p. 39). In the following sections, we describe ethnography and interaction analysis and discuss the pros and cons of using video data for these approaches.

5.1.1 Ethnography

Ethnography is a research approach with its roots in social and cultural anthropologists' study of the culture of small societies (Goulding, 2005, p. 298). Its original application was to document and interpret the modes of life of foreign cultures, i.e., cultures different from the researcher's culture (Hammersley & Atkinson, 2007, p. 1). Besides the study of tribes in foreign cultures, ethnography is also used to study "[…] our own subcultures, including communities, professions, experiences, and organizations" (Ruhleder & Jordan, 1997, p. 248).

For the purposes of this work, we used ethnographic methods in combination with grounded theory methods to account for the characteristics of teams as complex, adaptive and dynamic systems (McGrath, 1997, pp. 14-16), who are embedded in a larger social system (Cohen & Bailey, 1997, p. 241). The combination of grounded theory and ethnography is not extraordinary. For example, Pettigrew (2000) discusses the benefits of combining both methods in consumer research. Studies from social science on small groups and teams used to rely predominantly on laboratory experiments (McGrath, 1997, p. 15). With respect to research on group performance in organizations, Guzzo and Shea (1992, p. 306) observed that

ethnographic methods become more prevalent in addition to a shift from laboratory to field experiments. Regarding the study of innovation activities in teams (e.g., group brainstorming) laboratory experiments are still predominate (Paulus & Brown, 2007, p. 248). Although these studies lead to the identification of facilitating and inhibiting factors to creative idea generation processes, the complex processes in individuals and groups are still not fully understood (Paulus & Brown, 2007, p. 248). The benefit of ethnographic analysis is the thorough study of activities and their relations in a complex social situation, which might lead to new answers to questions that are taken for granted (Myers, 1999, p. 5). An example of an ethnographic study in research on information systems is Orlikowski's (1991) study regarding information systems related change of control mechanisms in organizations. In this study, she found empirical evidence that contradicted previous theoretical reasoning about the positive effects of information technology (Orlikowski, 1991, p. 39).

In ethnographic studies, data is used for the inference of hypothetical pattern (Goulding, 2005, p. 300). Ethnographers abstract from what people say or do in order to elicit the "[…] shared system of meanings […]" (Goulding, 2005, p. 298) of the group studied. An important sources of data are participant observation, interviews and documents (Myers, 1999, p. 4). In this study, we use a mixture of participant and non-participant observation to study what is really going on in teams with regard to the inclusion or exclusion of ideas, rather than theorizing about what should be going on. In relation to the overall project, in which our study was embedded, we conduced an overt participant observation, in which the study participants were aware of the researcher's identity and the general purpose of the study (Di Domenico & Phillips, 2009). Participants were told the study investigates an individual's behavior while using methods of idea generation and prototyping in project teams. The researcher's role was that of the teams' mentor. That is, the researcher was not part of one of the teams but rather an advisor, who guided the project teams' activities and line of action. In relation to the team meetings, which constitute the main objects of our analysis, we conducted a non-participant observation. In the team meetings, the researcher was only present at the beginning in order to briefly introduce the meeting task and at the end to discuss the meeting's result with the teams. Thereby, the researcher took over the role of the teams' mentor. The researcher was not present during the teams' actual work on the meeting task. According to Gold's (1957) distinction of possible roles in field studies, over the complete course of the project we predominantly took on the role of an *observer as participant* with instances of a *complete observer* (i.e., the videotaped meetings). Although we did not become a direct part of any of the teams studied, we engaged on many occasions in discussions with the teams about possible options on how to proceed as well as about ideas to enhance the their proposed solutions. The videotaped meetings were used to observe the teams' activities regarding idea inclusion and exclusion without influencing them. After the meeting, we actively engaged in discussions with the teams regarding their meeting results and gave them advice in the role as the teams' mentor.

5.1.2 Interaction Analysis

Interaction analysis is a method for the investigation of individuals' interactions with each other and with objects in their environment (Jordan & Henderson, 1995, p. 39). Its roots lie in various methods of social science, including participant observation and conversation analysis. One of interaction analysts' basic assumptions is "[…] that knowledge and action

are fundamentally social in origin, organization, and use, and are situated in particular social and material ecologies" (Jordan & Henderson, 1995, p. 39). That is, cognition is socially and structurally distributed (Hollan et al., 2000, pp. 176-178) and therefore knowledge and practice are situated in the interactions among individuals and their use of artifacts (Jordan & Henderson, 1995, p. 39).

We apply the methods of interaction analysis because the phenomenon under investigation occurs in the context of social and sociomaterial[3] interactions (cf. van Osch & Mendelson, 2011, p. 6f). Teamwork is inherently social (Hackman, 1987, p. 317) and design teams commonly create and interact with artifacts in order to cope with the ambiguity of their collaborative tasks (Stigliani & Ravasi, 2012, p. 1233). That is, cognition in teams is socially distributed as the team members exchange and process information among each other (Mangalaraj et al., 2014, p. 250) and it is structurally distributed as the team member interact with external representations of their own thoughts and of the thoughts of others (Kirsh, 2010, p. 454).

A major data source of interaction analysis is video data (Jordan & Henderson, 1995, p. 39). The main objects of investigation are not the outcomes of activities (e.g., documents or protocols) or ex post reports about activities (e.g., interviews or surveys) but the particulars of social interactions among members of a community of practice and how they unfold in time and space (Jordan & Henderson, 1995, p. 41). Video data enables an in-depth analysis of interactive phenomena through the possibility to watch interesting sequences over and over again with multiple viewers and on multiple occasions (Jordan & Henderson, 1995, p. 39; Ruhleder & Jordan, 1997, p. 255). This makes video data also interesting for grounded theory research on interactive phenomena because it enables constant comparison of sequences of interaction and thus informs the researcher's emerging theory trough observations of the actual interaction instead of a description of it.

A variety of activities that fit well into the application of grounded theory methods and ethnographic observations have to be performed in the course of a video-based interaction analysis (cf. Knoblauch, Tuma, & Schnettler, 2014, pp. 444-446). According to Suchman and Trigg (1991, p. 80) interaction analysis is an ongoing process that involves the following interrelated activities: (1) viewing and re-viewing the videotapes either alone or in a group, (2) generating logs about observed activities and the video content, (3) analyzing individual sequences in detail, (4) integrating multiple records of the same activity, (5) gathering similar activities into collections and identifying conceptual categories, and (6) comparing multiple analytical perspectives regarding the same activity.

5.1.3 Pros and Cons of using Video Data and Video Analysis

Video recordings are a valuable source of data. This is especially true for the investigation of complex social behaviors and sociomaterial interactions (Jordan & Henderson, 1995, p. 39;

[3] Sociomaterial is a fusion of the two terms socio and material. According to Orlikowski (2007) "[..] the social and the material are considered to be inextricably related – there is no social that is not also material, and no material that is not also social" (Orlikowski, 2007, p. 1437).

Ruhleder & Jordan, 1997, p. 246f; Suchman & Trigg, 1991, p. 75f; van Osch & Mendelson, 2011, p. 6). Yet as with any source of data, the use of video data comes with inherent advantages and challenges. In the following, we discuss the advantages and challenges of collecting and using video data for the research on human subjects.

Challenges in Matters of Collecting and Using Video Data

An important downside of video recording is that it may change the behavior of people, and thus, distort the observed phenomena. Yet this applies to any kind of obtrusive method of recording (Jordan & Henderson, 1995, p. 56), including audio recording during interviews for subsequent transcription. In addition, research has shown that people quickly forget about being filmed when they engage in cognitively demanding activities (Jordan & Henderson, 1995, p. 55). For example, Wiemann (1981) investigated the possible reactivity of video recording. The study lends support to the common assumption that behaviors, which are typically out of awareness, are not affected by video recording. In addition, it was found that anxiety declined and stabilized within three minutes (Wiemann, 1981, p. 309). However, with regard to the responsiveness of participants indications of a social desirability effect was found, because individuals, who were aware of being video recorded, were also more responsive (Wiemann, 1981, p. 310). In conclusion, Wiemann (1981, p. 310) suggests to inform participants of being video recorded and then make the video recording as unobtrusive as possible. Following this advice, we informed the observed individuals in our study that they would be video recorded. In addition, we used recording devices that were unobtrusive, needed no operator and fitted well into the ambience of the room. We used the webcams of two out of five iMacs, which were standing in the meeting room, for the video recordings and we used a smartphone for the audio recordings. In these conditions, people are likely to quickly habituate to the situation of being video recorded (Jordan & Henderson, 1995, p. 55). This was also observable on our videos. As soon as individuals became involved in the task of the meeting the camera effects visibly wear off and instances, in which they engaged in talks about the course and the teaching team, clearly indicated that they forgot about being video recorded.

Another difficulty of video data is that, despite the best efforts in setting up and conducting the video recording, the "[…] record will always be impoverished in some way or other […]" (Jordan & Henderson, 1995, p. 54). It is impossible to capture everything on video that happens in reality. The setup of the recording device (e.g., direction and zoom) determines the individuals and objects that are visible or audible and who or what is not (Jordan & Henderson, 1995, p. 53). By using recording devices with a fixed position that needed no operator we were able to make the recording unobtrusive (see previous point). The drawback of this setting, however, is that the setup of the recording device cannot be manipulated during the videotaping. If the observed participants, for example, work in other parts of the room as we had expected, then they might not be captured on the video. As a countermeasure, we used two recording devices that captured different parts of the room. Nonetheless, what the recording device did not capture cannot be analyzed (Jordan & Henderson, 1995, p. 54). This is also true for situations, in which on person covers another one. For our study, we used two devices for audio and video recording that captured different parts of the room and a supplemental device for audio recording that was placed in the center of the room. Thereby,

the fixed position of the recording devices provided the benefit to cover the scene consistently over all recordings (Jordan & Henderson, 1995, p. 54).

Besides the difficulties that are related with the collection of video data, other drawbacks are concerned with the data itself and the inherent loss of information (Jordan & Henderson, 1995, p. 53). A video provides not an objective, correct representation of the recorded reality but rather "[…] a transformation of that world […]" (Jordan & Henderson, 1995, p. 53). The original event is always more rich than the transformation. For example, the lighting conditions on the video recording are different than they were in reality. It depends on the light intensity of the recording device. Therefore, things might appear to be darker than they were in reality or certain objects are not recognizable because they are covered in a shadow. Recorded sounds and voiced are different, too. Depending on the environment and the distance between the speaker and the recording device, some statements might not be understandable due to overlaying sounds. Moreover, a three-dimensional scene is captured on a two-dimensional video. This might influence the interpretation of interactions between individuals or between an individual and an object.

Another disadvantage of video analysis is concerned with the researcher's interaction with the collected video data during his or her analysis. The analysis of video data requires a substantial investment of time and effort (Jordan & Henderson, 1995, p. 50). Transcribing the videos is often one of the first steps in the analysis of video data (Suchman & Trigg, 1991, p. 77). Depending on the level of details that should be captured in the transcript, this can be a very demanding and time-consuming task due to the rich content. In addition, the search for instances of particular events or activities is tedious and requires a meticulous preparation and documentation of the acquired video data (Jordan & Henderson, 1995, p. 50). Moreover, unlike other tasks, including the execution of common statistical tests, the analysis of videos cannot easily be delegated to subordinates or helpers as a profound understanding of the object of investigation requires "[…] proceeding through successive approximations until the relevant analytic categories are identified" (Jordan & Henderson, 1995, p. 50). That is, the researcher has to spend a considerable amount of time and has to deeply engage in the analysis of the video data in order to draw valuable conclusions based on the observed scenes.

Advantages and Benefits in Matters of Collecting and Using Video Data

Although video data and its analysis have considerable disadvantages, which are discussed in the previous section, it enables unique possibilities for the study of complex social interactions. The selective collection and analysis of video recordings is a valuable analytic tool especially for the study of work practices in complex real-world settings (Jordan & Henderson, 1995, p. 50; Ruhleder & Jordan, 1997, p. 256). According to Jordan and Henderson (1995), video approximates direct observation and thereby helps to overcome the gap "[…] between what people say they do and what they, in fact, do" (Jordan & Henderson, 1995, p. 50). For example, Weick's (1995) research on groups and teams suggests that individuals engage in ex post activities, in which they try to make sense of events. Thereby, their explanation of what happened is not a faithful account of the actual event but rather an ex post rationalization based on ex ante hypotheses about causal relationships (Weick et al., 2005, p. 415) with an unconscious focus on plausibility instead of accuracy (Weick, 1995, p. 57). If we are interested in what actually happens in teams instead of the team members'

interpretations of what happened, video data is the best we can get (Jordan & Henderson, 1995, p. 50).

An alternative approach to video recordings of participants would be to directly observe them combined with taking field notes. However, even a trained observer cannot capture all the simultaneous and overlapping interactions that take place in meetings with several individuals (Jordan & Henderson, 1995, p. 52; Ruhleder & Jordan, 1997, p. 255). In addition, words are less rich than pictures. Thus, field notes cannot capture the full complexity of the interactions between several people (Ruhleder & Jordan, 1997, p. 255; van Osch & Mendelson, 2011, p. 6). Video, on the other hand, preserves theses events and the individuals' interrelated activities. This allows the careful analysis of the observed scenes. Field notes might provide supplementary information for the analysis, while the video provides rich information on the observed events (van Osch & Mendelson, 2011, p. 6). Thereby, video is a powerful tool to support the analysis of interactions because of its capability to capture and preserve rich records of events and activities (Henderson, 1989, p. 105). That is, video recordings preserve sequences of events in a certain context, and thus, enable the identification of antecedents that led to a particular state (Ruhleder & Jordan, 1997, p. 256).

A further benefit of video data is the "[…] permanence of the primary record in all its richness" (Jordan & Henderson, 1995, p. 52). That is, a video recorded interaction is permanently stored. This enables the replay of interesting scenes over and over again in order to keep track of the simultaneous or overlapping activities of several individuals and allows for an accurate and in-depth analysis of these interactions (Jordan & Henderson, 1995, p. 52). For example, a researcher can focus on different aspects of an event each time he or she replays the video until he or she accurately understands the observed scene. In addition, video data enables the comparison of different sequences in order to identify similarities and differences in the participants' behaviors and interactions (Suchman & Trigg, 1991, pp. 78, 80). This possibility is essential for constant comparison in grounded theory research (Charmaz, 2014, p. 323; Knoblauch et al., 2014, p. 445).

In addition to the possibility to view and listen to video recordings for an unlimited number of times, video data has a further advantage. Video records make it possible to analyze the same events or activities form various perspectives and at different points in time (Ruhleder & Jordan, 1997, p. 255; Suchman & Trigg, 1991, p. 80; van Osch & Mendelson, 2011, p. 6). Seeing something only for one time might cause a researcher to draw erroneous conclusions (Suchman & Trigg, 1991, p. 78). The emotions that the researcher experiences during the observation might influence his or her interpretations and perspectives (Schultze, 2000, pp. 6f, 21). The possibility to view and review observational data helps in correcting those potential incorrect interpretations (Suchman & Trigg, 1991, p. 78).

5.2 Research Setting

The context in which teams operate is an important but often neglected factor in research on teams (Chiocchio & Essiembre, 2009, p. 392; Cohen & Bailey, 1997, p. 279). Therefore, this section provides a comprehensive description of the general context of our study on teams. Following Charmaz's (2014, p. 14) constructivist grounded theory approach, we acknowledge our subjectivity and involvement in the construction and interpretation of the data collected

and studied in our empirical study on idea inclusion and exclusion. Consequently, we deem it important to lay open our previous experience with innovation projects and student teams.

The section is structured as follows. First, we provide background information on the research setting and describe our previous experience with respect to projects similar to those investigated in this thesis. Second, we describe the similarities and differences between innovation projects in the discovery phase of the innovation process that are carried out by a company's project teams and those projects that are commissioned by a company and carried out by student teams as an assignment in a university course.

5.2.1 Background Information on the Research Setting

Previous to this study, we explored several cases. Thereby, we investigated factors that influence the creativity of a team's outcome. These studies (see Table 1) were part of a three-year research project with the department IT Car Concepts at AUDI AG, which is concerned with the preliminary design and development of innovative application for the connected car (cf. Bauer, 2011; Hoffmann & Leimeister, 2011). During this research project, we conducted and observed three advanced practical courses at TUM that were commissioned by employees of the department IT Car Concepts at AUDI AG. In addition, we conducted and observed one advanced practical course at TUM that was jointly commissioned by employees of RE'FLEKT GmbH, which is a company in the field of user-oriented augmented reality solutions (see also chapter 5.4.4), and members of ParkMünchen, which is a startup that developed a mobile application for finding free on-street parking spaces in cities. Overall, the observed teams worked on a similar task: The development of innovative and profitable mobile services to support effective and sustainable individual mobility.

The observed cases were embedded in the graduate-level university course "Advanced Practical Course: Automotive Services". This is a semester-long (i.e., about four months) course at TUM for master students who are enrolled in a degree program such as computer science or information systems at the TUM Department of Informatics. Students receive a grade for the participation in this course. This grade constitutes one-twelfth of their overall grade for their master's degree. Depending on the degree program it is either an optional subject or an elective course. In both cases students can choose among several practical courses with different main foci.

The aim of this advanced practical course is to provide students with the possibility to experience the full cycle from an idea to a potential start-up company. Thereby, the students work in small teams (usually 3 to 5 team member) on the creation of an innovative solution to a real-world problem. The course assignment consists of problem identification, idea generation, service design, business case, and development of a functional prototype as well as a promotional video to showcase the proposed solution. The corporate partner specifies in coordination with the lecturer and the teaching assistants the problem that the student teams will address during their semester-long project. This ensures the practical relevance of the addressed problem as well as its suitability for a university course. Employees of the corporate partner give the teams feedback and ensure the practical relevance of the designed solutions. The problem is intentionally phrased as an ambiguous challenge that requires the team to identify a specific problem in the first place and afterwards develop a suitable

solution to this problem. For example, in the summer term 2011 the teams were asked to develop an innovative in-car application to provide a meaningful service to a car driver by using social media. In order to avoid obvious solutions like the in-car integration of a Facebook application, which is already taken care of by car companies, the teaching assistants asked the students to interview car driver and identify the major problems they face when driving a car. For example, the team ParkWunder considered finding an empty parking space in cities as an important problem. The team's solution was then a mobile application that connects a car driver, who is about to leave a parking space, and a car driver, who is searching for an empty parking space. The synchronous connection of searcher and offerer enables them to exchange the parking lot by using a procedure, which the team called 'handshake'. After the university course was finished the team presented their solution to a broader audience of employees of the car company, which participated in this course as the practical partner. In agreement with the car company the students founded a non-profit startup and made their smartphone application (ParkMünchen) available in the Apple App Store. The car company proceeded to work on this solution, too. Overall, the cooperation between employees of companies, university staff and students lead in the past to the development of promising proposals for innovative mobile services. Some of the ideas developed in this university course were taken up and further developed either by the corporate partner or by the students.

Table 1. Overview of the cases of the Advanced Practical Course: Automotive Services that where used as pilot studies

Case No.	Term	Number of teams (Avg. team size)	Topic	Challenge	Corporate partner
1	summer 2011	4 (4)	Social media	Development of an innovative in-car application to provide meaningful services to the car driver by using social media	Department IT Car Concepts at AUDI AG
2	winter 2011/12	3 (2.3)	Mobil work	Development of an innovative in-car application to enable mobile work while driving a car	
3	summer 2012	4 (5.25)	Mobility services	Combination of existing and novel digital mobility services in order to provide a new meaningful service to the customer	
4	summer 2013	4 (3.5)	Parking services	Development of an innovative digital service to make additional parking for car drivers available without high up-front investments	RE'FLEKT GmbH and ParkMünchen

The first four cases of the advanced practical course had enabled us to gain a deeper understanding of how teams collaboratively address an assigned design problem and evolve their initial ideas into proposed solutions. All observed student teams were asked to create

innovative solutions to topics assigned by the respective corporate partner. Table 1 provides an overview of the topics that were addressed in the four cases. According to Amabile (1998, p. 81) freedom in terms of the autonomy to decide how to approach a goal fosters the intrinsic motivation of team members, which in turn is beneficial with regard to their creativity. However, for new product development projects it is rather unrealistic that a team can freely decide which new product they want to build. There are almost always external requirements like the corporate strategy or management decisions that the team has to comply with. Therefore, employees of the corporate partner formulated an abstract challenge that specified a direction for the student teams. The teams could then develop their own ideas freely within the given limits.

We embedded our research in the "Advanced Practical Course: Automotive Services" at TUM for the following six reasons. First, this allowed us to closely observe the behavior of individuals and teams in design projects and yet study teams in a setting that is suitable to yield practically relevant findings. Teams of students that work on a course project are „[…] as real as any other type of teams" (Chiocchio & Essiembre, 2009, p. 385).

Second, we could influence the conditions of the setting for subsequent projects based on our lessons learned. For example, we could use different idea generation approaches or vary the duration of the idea generation phase compared to the elaboration and implementation phase.

Third, employees of a company formulated the challenges for the project teams based on topics that were of practical relevance for them. Thereby the teams tackled real-world problems, that is, problems that have neither obvious solutions nor a single correct solution. This requires teams to generate and explore alternative ideas, discuss and negotiate which ideas to choose, and finally choose an idea according to their preferences (McGrath, 1984, p. 61). The generation of an innovative solution for an abstractly formulated challenges or the development of concepts for new software produces are open-ended tasks (Briggs & Reinig, 2010, p. 128) with an ambiguous goal. This is, because the assessment of the outcome is dependent on the evaluator's individual preferences as well as the temporal and social context (Goh et al., 2013, p. 165; Lampel, Lant, & Shamsie, 2000, p. 264f).

Fourth, the teams had to complete interdependent tasks, which required them to collaborate. Research suggests that collaborative work on the elaboration of an idea increases its quality (Blohm et al., 2011, p. 117) measured in terms of novelty, relevance, elaboration and feasibility (Blohm et al., 2011, p. 110).

Fifth, the teams engaged in the development of the final deliverable over a period of several months. Thereby, the team members had enough time to develop a team identity and get to know each other during their collaborative work on achieving a joint goal (Schilpzand et al., 2011, p. 63). When studying team processes, this is preferable compared to laboratory experiments, in which teams are created randomly in an ad hoc manner and work together only for a short period of time (McGrath, 1997, p. 16; Mullen & Copper, 1994, p. 213; Schilpzand et al., 2011, p. 63f).

Sixth, the participants knew beforehand about the challenging course assignment of creating an innovative solution in a small team. As they chose this course among several available

options, it could be assumed that they were interested in the development of an innovative mobile service. Furthermore, the teams could pursue their own ideas within certain limits, received attention from a renowned company's employees, and worked in a supportive but challenging environment. Therefore, it could be assumed that the assigned project was meaningful and important for them. In addition, as the teams participated in academic work with course credit as their performance incentive, it could be assumed that they were functioning work teams (Barry & Stewart, 1997, p. 67; Schilpzand et al., 2011, p. 64).

5.2.2 Similarities and Differences between Company and Student Projects

The close cooperation with employees of the department IT Car Concepts at AUDI AG during the three-year research project enabled us also to gain a nuanced understanding of the department's work practices regarding idea generation as well as the design and development of innovative mobile application and digital services. We had the chance to work with employees of the department on a regularly basis, attend meetings and discuss opportunities for new projects. In addition, we supported some of the department's other cooperation projects with universities (one at Technische Hochschule Ingolstadt, Germany, two at University of St.Gallen, Switzerland, with one of which was a joint project together with the University of Modena and Reggio Emilia, Italy), in which student teams designed and developed digital services for the connected car in order to attract new customers.

Table 2. Overview of the differences and similarities regarding the roles between real-world company projects and student projects

Role	Function	Company Project	Student Project
Project Leader at contracting authority	Specifies topic and assess results	Employee at contracting authority	Employee at contracting authority & lecturer at university
Project Leader at contractor	Coordination between contracting authority and project team	Employee at contractor (Can also be the team leader at contractor; supervises several teams)	Teaching assistant(s) at university (Supervises several teams)
Team Leader	Coordination between contractor and project team	Employee at contractor (Can also be the project manager at contractor; supervises one team)	Student at university (A member of the student team; contact person for the teaching assistant; contributes directly to the project outcome)
Project Team	Design and development of the outcome	Employees at contractor (Mostly heterogeneous teams in which people with different specialization work together)	Students at university (Mostly homogeneous teams in which students enrolled in computer science or information systems work together)

Over the course of our project at the premium car manufacturer we noticed a prevailing approach with respect to the development of an innovative digital service: First, define a

problem or opportunity and then commission a supplier to develop a solution for the assigned problem. During the project the contracting authority (i.e., the project leader, who is responsible for this project at the car manufacturer) and the contractor (i.e., either a developer for small projects or a project leader at the supplier for larger projects) regularly meet, discuss the current status of the project and define the future course of action. For small suppliers the role of the project leader at the contractor can also be taken directly by the team leader. The project team creates the actual outcome of the project. As shown in Table 2, the development projects for innovative digital services at a company and the projects carried out by the students in a practical university course like the "Advanced Practical Course: Automotive Services" are structurally very similar. Major differences are the absence of contracts and payments between the contracting authority (company), the contractor (university) and the project team (employees vs. students) as well as the kind of extrinsic motivators (monthly salary vs. a grad at the end of the semester). In addition, not all students have work experience and the consequences of failing in a student project are less severe than in real-world projects. Moreover, the authority to give directives is limited in the student projects, i.e., decisions regarding the project's outcome have to be reached by consensus between the university staff and the student project team rather than being enforced by instructions, which is possible for company projects.

5.3 Sample and Case Selection

This section describes the sample and the case, which we had selected for our study. Thereby, we intent to draw a rich picture regarding our study's context and the investigated subjects.

The section is structured as follows. First, we explain why we used a student sample instead of observing practitioners. In addition, we explain our rationale why we think that a student sample is appropriate for this research and yields insights on teams that are interesting and valuable for both companies and academia. Second, we describe our case selection criteria.

5.3.1 Sample Selection

We decided to observe teams of graduate students who work on a course project in an academic setting for two reasons. First, we wanted to interact intensively with the project owner (i.e., the course's corporate partner) as well as with the project teams (i.e., the course's student teams) and closely observe the teams' work and progress. Second, we wanted to study team meetings, in which teams work on certain tasks, and videotape these meetings for a subsequent in-depth analysis.

The observations of team members during actual instances of interactions is believed to be an ideal research design for the study of project teams that is, however, hard to implement (Vlaar, van Fenema, & Tiwari, 2008, p. 246). Observational methods are especially beneficial when the behavior of interest is social (i.e., involving interaction between two or more participants), and when the phenomenon of interest is a process rather than an outcome (i.e., the ways and means by which interaction unfolds over time). In this respect, the collection of video data is a helpful practice in research on interactions in teams (Knoblauch et al., 2014, p. 436).

Although participant observations are possible to obtain in field research it is rare to have the opportunity to observe the confidential meetings of teams working on innovation projects, let alone videotape them and analyze the behavior of employees at work. Due to the sensitivity of innovation projects in highly competitive markets such as the automobile industry it is not surprising that companies are reluctant to the idea of having their design teams videotaped during meetings, in which they discuss the company's next product invention.

An alternative approach, which is commonly applied to gain information about social phenomena that are hard to observe, would be the conduction of interviews. Considering the advantages and disadvantages of video and interview data for our planned multifaceted qualitative analyses (see chapter 2.4), we opted for video data. Video data has advantages over interview data including the possibilities for an in-depth analysis of complex interactions (Knoblauch et al., 2014, p. 436; van Osch & Mendelson, 2011, p. 6). The use of a student sample gave us the opportunity to obtain video data as well as detailed information about the context of the project, the executed tasks, and how the teams approached the tasks.

However, the use of a convenience sample of students comes with well-known disadvantages in terms of a limited generalizability of the results (Bello, Leung, Radebaugh, Tung, & Van Witteloostuijn, 2009, p. 362f). Even though the observation of practitioners in employment settings might lead to superior findings in terms of practical implications, numerous studies of student teams have already yielded useful findings regarding the dynamics in teams and group creativity (e.g. Barczak, Lassk, & Mulki, 2010; Chiocchio, 2007; Chiocchio & Essiembre, 2009; Gersick, 1988). As Chiocchio and Essiembre (2009) noted in their meta-analytic review on cohesion and performance of different types of teams: "Teams of undergraduate or graduate students are as real as any other type of teams" (Chiocchio & Essiembre, 2009, p. 385).

Still, it could be argued that practitioners have more experience in project work, and therefore, behave differently compared to students. Yet regarding group development and group behavior Gersick (1988) observed in her grounded theory study on transition in work teams that teams of students and teams of practitioners followed the same underlying pattern over time. In addition, team assignments are increasingly common in university seminars and practical courses (e.g. Deeter-Schmelz et al., 2002), and thus, graduate students can be expected to have at least preliminary experience in teamwork.

Furthermore, it could be argued that a student sample is systematically different from a practitioner sample because of its narrow age range and the high educational background of the participants (Sears, 1986, p. 521). However, with regard to the context of teams for new product development a high educational background is quite common (e.g. Ancona & Caldwell, 1992, p. 327; Hirunyawipada & Paswan, 2013, p. 2334). In addition, an average age of the team members below 30 years is not uncommon among software development teams that create products such as mobile applications (e.g. Goh et al., 2013, p. 165).

Overall, we came to the conclusion that the advantages of using graduate students in our study outweigh the disadvantages of a limited generalizability of the results. The use of a student sample gave us the opportunity to obtain the video data necessary for an in-depth analysis of the complex social interactions during team meetings. In addition, we could gather

comprehensive information about the setting of the projects and how the teams approached the tasks over the course of the projects. At the same time, it enabled us to study functional project teams who work collaboratively on interdependent tasks, interact on multiple occasions over the course of several months, share responsibility for their outcome and have to make interdependent decisions about what they create.

5.3.2 Case Selection

We decided to embed our study into an advanced practical course in an academic setting in order to investigate the phenomenon of interest in a more realistic setting for an innovation project compared to laboratory experiments. In addition, this setting enabled us to simultaneously study several project teams in a comparable setting. Even though we opted for the investigation of a case in an academic setting, we choose a setting that replicated important features of the business world. Therefore, we applied the following case selection criteria.

First, we selected projects, in which student teams tackled real-world design problems in a setting that features typical characteristics of projects and project-related meetings, for example, the existence of a deadline (Gersick, 1988, p. 13). Real-world problems consist of well- and ill-structured components (Goel, 2014). For well-structured problems the start and goal states as well as the necessary transformation functions are known (Goel, 2014, p. 3). An example by Goel (1995) of a well-structured problem is the game tic-tac-toe, in which nine blank squares on a sheet of paper constitute the start state. Placing a mark in anyone of the blank squares is the transformation function. Placing three marks of the same kind in a consecutive horizontal, diagonal or vertical line is the goal state (Goel, 1995, p. 77). In contrast, ill-structured problems exhibit only incomplete information about the start and goal state as well as the necessary transformation. In addition, while some of the constraints are inherent of the task others are flexible and negotiable (Goel, 2014, p. 3f). An example by Goel (1995) of an ill-structured problem is the task to design a building: neither the start and goal states are specified nor the transformation function (Goel, 1995, p. 78). Thus, in tackling ill-structured problems, teams face manifold options of possible means (i.e., tools and techniques) for developing a solution. This is quite common for projects. A team carries out routine and non-routine tasks to create a unique outcome (Manning, 2008, p. 31). In the selected case, practitioners of the corporate partner provided the problem statement, which was formulated as an abstract challenge. The teams worked on those challenges and presented their results to practitioners of the corporate partner as well as to the teaching team and the other students, who participated in this university course. Hence, the students received feedback from a broad audience. In addition, the teams were required to interview potential users of their service in order to learn more about the requirements and needs of their target customers.

Second, project teams that work on the design of new products commence the projects not knowing exactly what the final outcome will be (Wiltschnig et al., 2013, p. 515). Therefore, the project teams have to cope with uncertainty and they have to learn, invent, and change as they create something new (Gersick & Davis-Sacks, 1990, p. 146). In the selected case the final result of the project was unknown in advance and depended mostly on the decisions of the teams. Only certain deliverables (e.g., project documentation, final presentation,

demonstration video and an experienceable prototype of their mobile application) were specified in advance. This required the teams to simultaneously evolve a shared understanding of the problem and develop possible solutions to the problem (Dorst & Cross, 2001). In doing so, the teams had to engage in communication processes, in which they used several qualitatively different languages, including natural language (e.g., to explain and discuss their ideas), sketching (e.g., to illustrate a suggested user interface design), business jargon (e.g., to describe a sound business model) and programming languages (e.g., to implement prototypes of their mobile applications). Therefore, the teams engaged in a variety of activities that made use of different forms of representation and fostered various modes of collaboration, which are common in design projects.

Third, we studied small teams, who worked collaboratively on open-ended tasks that required the generation and elaboration of a creative solution in an ambiguous and uncertain setting. The observed project teams tackled issues at the early stages of the innovation process. More precisely, we studied the discovery phase of the innovation process (cf. Durmuşoğlu & Barczak, 2011, p. 322), in which idea generation and concept development take place (Reid & de Brentani, 2004, p. 171; Trott, 2008, p. 14). During this phase, teams engage in activities that are typical for design problem-solving including problem scoping and framing activities as well as the generation and refinement of preliminary ideas in order to evolve a tentative solution into a final one (Goel, 2014, p. 5). In addition, we observed projects in which the development of novel and useful mobile services, which are accepted by others, was the core requirement. Mobile services are technology-based services that offer their value during usage in a specific context (Sandström, Edvardsson, Kristensson, & Magnusson, 2008, p. 113). Hence, teams have to cope with changing and unclear requirements, because the evaluation of the outcome is dependent on the evaluator's individual preferences as well as the temporal and social context (Lampel et al., 2000, p. 264). This context makes recurrent communication within and beyond the team necessary.

Overall, we studied the topic of idea inclusion and exclusion in the context of project teams, who develop interactive services that are offered and accessed via mobile applications. The definition and assessment of these mobile services is highly subjective and depends on the social and temporal context (Lampel et al., 2000, p. 264). That is, there is no right or wrong solution but only a more or less preferable one from the idiosyncratic perspective of the audience. In addition, the outcome is open-ended and hard to specify (Goh et al., 2013, p. 165). Yet, the inherent ambiguity based on the interactivity and virtuality of the developed digital product adds not only an additional level of complexity to the task of the project team but makes it also highly relevant for today's companies and their need to create innovative products.

5.4 Descriptions of the Investigated Case

This section describes the investigated case. For the study of teams, a detailed description of the circumstances in which the team acts is necessary to enable meaningful interpretation of the study's results (Chiocchio & Essiembre, 2009, p. 392; Cohen & Bailey, 1997, p. 279). Section 5.2 provides an overview of the overall setting, in which we conduced our study. Therefore, the following sections provide specific background information and describe explicitly the case investigated for this thesis.

We observed graduate students who participated in the winter term 2013/2014 of the university course "Advanced Practical Course: Automotive Services" at TUM. It was the eighth iteration of this course at TUM. RE'FLEKT GmbH served as the corporate partner for the second time.

The section is structured as follows. First, we provide information about the goal, challenge and the requested deliverables of the investigated case. Second, we describe the project teams and their characteristics. Third, we describe the teaching team because we investigated a university course in our study. Fourth, we describe the corporate partner, which helped to create a realistic setting with a higher practical relevance for the student teams. Finally, we delineate the overall structure of the observed projects.

5.4.1 Goal, Challenge and Requested Deliverables

One of the overall aims of the practical course is to inspire students to tackle the pressing challenges towards sustainable individual mobility by means of digital technologies. The goal of the instance of the course, which we analyzed for this thesis, was the design of an innovative mobile software application that enhances sustainable individual mobility for travelers on business trips. The respective challenge for the teams was: *Integrate the power of augmented reality and data fusion to enhance sustainable individual mobility for travelers on business trips.*

This challenge requires the consideration of the specific needs of business travelers as well as the particular offerings of augmented reality and data fusion. Business travelers comprise a sufficiently large and diverse target audience that gave the teams plenty of opportunities for the identification of unfulfilled user needs. Augmented reality is an emerging technology that uses information in real-time in order to integrate virtual enhancements (e.g., text or graphics) with real-world objects (Nguyen & Lu, 2013, p. 65). Data fusion is a real-time approach to data integration. With data fusion an application retrieves relevant information not based on user-initiated queries but rather based on algorithms that use metadata about the available information as well as the users current task (Beyer, 2007, p. 1f). As the corporate partner of this course develops augmented reality solutions it was in their interest that the teams' proposed solutions make use of the augmented reality technology. The lecturer (L) of the course added data fusion to the challenge because it complements augmented reality in the creation of pervasive, context and location aware mobile applications.

The broad and ambiguous specification of the challenge gave the teams, on the one hand, the freedom to generate and pursue their own ideas (within the given limits), but, on the other hand, it required the creative act of rendering an ill-defined problem more precise (Stacey & Eckert, 2010, p. 242). The teams had to identify an interesting unsolved problem or opportunity according to the challenge and then develop a proposed solution. Thereby, the teams had to iteratively evolve the problem addressed and the tentative solution in a creative design process (Dorst & Cross, 2001, p. 434). The weak constraints that were imposed by the challenge gave the teams the possibility to pursue an idea that was meaningful for them. Intrinsic motivation through personal interest and the challenge of the work itself fosters creativity (Amabile, 1998, p. 79). In addition, the regular feedback and interest in the teams' projects from the corporate partner and the teaching team was intended to increase the teams

effort and motivation without imposing a feeling of control or lost autonomy (Ariely, Kamenica, & Prelec, 2008, p. 677; Locke & Latham, 2002, p. 708).

Another aim of the practical course is to give students the possibility to experience the full cycle from an idea to a potential start-up. The project goal for the teams was to identify an interesting unsolved problem or opportunity with a significant market potential and demonstrate how this problem could be solved or the opportunity realized by developing a showcase for their proposed solution. Thereby, students work in small teams on the collaborative development of a possible solution to the assigned problem. The project result was defined in terms of deliverables. The teams were asked to create a project journal, in which they keep records of their course of action, meetings, decisions and lessons learned. The format and structure of this project journal was not further specified. In addition, the teams had to accomplish several tasks and document their results as well as give status reports. The most important deliverable, however, were the artifacts for the final presentation of the project: a PowerPoint presentation, a marketing poster, a promotional video and an executable prototype that demonstrates the feasibility of the intended mobile application. The intent of the final presentation was to 'sell' the proposed solution, i.e., find a supporter or potential ally who help implement it (Kanter, 1988, p. 184) and/or facilitate its diffusion (Kanter, 1988, p. 191).

In summary, the teams worked on a real-world challenge. They were required to identify an unresolved problem or opportunity with a significant market potential and showcase their proposed solution. The final result was a service design, business model and showcase for an innovative mobile service that attracts others to support the realization of the idea. Overall, the teams followed a multistage innovation process, in which they (1) identified an opportunity for innovation (Kanter, 1988, p. 173), (2) convince others to support the idea (Kanter, 1988, p. 184) and (3) created a prototype of their proposed solution that could be experienced and used to facilitate the diffusion of the innovation (Kanter, 1988, p. 190f).

5.4.2 The Project Teams

This section describes the participants of our study. First, it gives a general overview of all participants. The data was gathered via an online survey at the beginning of the course. Table 3 gives an overview of the demographic characteristics of the participants. Initially, 12 students were registered for this course but one student (marked with the alias X) dropped out after the kickoff meeting, and thus, is not considered any further. Second, we describe the investigated teams in more detail. For this purpose we use data that was gathered with various questionnaires (see chapters 5.5.2 and 5.5.3 for a description of the questionnaires), information that was provided as part of the coursework as well as information from personal conversations and our observations.

Overall it has to be noted that the small number of individuals and teams in this study makes it not eligible to draw any general conclusions based on the values of individual personal attributes or their distribution in the teams. Yet, the description of the teams' characteristics with regard to their demographic diversity, composition of language and programming skills as well as selected personal attributes might help in the interpretation of the teams' behavior and results.

Our sample consists of 11 graduate students attending a master degree program in computer science (n=5), information systems (n=4), or automotive software engineering (n=2). Two out of the five computer science studies were exchange students from Wroclaw University of Technology, Wroclaw, Poland. All other participants were students in the respective degree program at Technical University of Munich, Germany. Despite the relative homogeneity of the participants with respect to their general course of studies in the domain of information technology varied the specific orientation of the three different degree programs. The master's program in Informatics[4] is a research-oriented degree, in which students can choose to specialize in a variety of areas, including software engineering, scientific computing, and algorithms. In addition, the program incorporates several interdisciplinary modules that teach, for example, management skills. The focus of the master's program in Information Systems[5] is on the management of information and communication technology (ICT) within business organizations. The goal of the program is to educate students with the skills necessary to develop innovative business solutions in consideration of social, technical and economic aspects. The master's program Automotive Software Engineering[6] is a research-oriented and application-focused program with a strong focus on software engineering. In addition, it teaches professional skills and subjects specific to the automotive domain. Each of the degree programs has a standard period of study of four semesters with each semester lasting for 6 month.

All participants had previously received a bachelor's degree and now took part in the "Advanced Practical Course: Automotive Services", which is an English graduate-level course on developing innovative software solutions at TUM (see chapter 5.1 for a comprehensive description of the course). The participants were predominantly male (n=9). About half of them (n=6) were born in Germany. Other nationalities were Chinese (n=2), Polish (n=2) and Greek (n=1). On average, they were 24.5 years old (SD=1.4). All participants had, on average, good English language skills. The distribution of the participants' primary language was German (n=6), Chinese (n=2), Greek, Polish and English (each n=1). In addition, the participants had, on average, an advanced experience in more than two programming languages (mean=2.3, SD=1.7), and possessed at least an expectable average knowledge regarding software and service engineering, design and economics. Each participant owned a smartphone and used it frequently. This indicates that the participants were knowledgeable in matters of using mobile applications. In addition, we learned from personal conversations with the participants that some of them had already experience in mobile software development.

[4] http://www.in.tum.de/en/for-prospective-students/masters-programs/informatics.html

[5] http://www.in.tum.de/en/for-prospective-students/masters-programs/information-systems.html

[6] http://www.in.tum.de/en/for-prospective-students/masters-programs/automotive-software-engineering.html

Table 3. Overview of the Participants

Team	Alias[7]	Degree Program	Semester	Nationality	Primary language	English Language Skills	Gender	Age
A2B	A1	Automotive Software Engineering	3rd	German	German	satisfactory	male	24
	A2	Information Systems	1st	German	German	good	male	25
	A3	Automotive Software Engineering	3rd	German	German	good	male	25
TripAssistant	M1	Information Systems	3rd	Chinese	Chinese	satisfactory	female	24
	M2	Information Systems	3rd	Chinese	Chinese	good	female	24
	M3	Computer Science	2nd	German	German	satisfactory	male	25
	M4	Computer Science	2nd	German	German	good	male	24
Tripster	T1	Information Systems	4th	Greek	Greek	good	male	28
	T2	Computer Science	1st	Polish	Polish	good	male	23
	T3	Computer Science	1st	German	German	good	male	25
	T4	Computer Science	1st	Polish	English	good	male	23
n/a	X	Information Systems	2nd	Chinese	Chinese	satisfactory	female	24

5.4.2.1 Characteristics of Team 1: A2B

The team A2B consisted of three Germans who were all male and almost of the same age (see Table 3 for an overview of the demographic characteristics). All three participated in a degree program at the TUM Department of Informatics. Two of them (A1 and A3) studied Automotive Software Engineering in their third semester and one (A2) studied Information Systems in his first semester.

[7] For reasons of confidentiality, we use pseudonyms here.

The team members provided the following information with respect to their English language proficiency and their programming language skills. Two member of the team had a good (A2 and A3) and one (A1) a satisfactory proficiency of the English language. With regard to the optional information of skills in programming languages provided A1 no information. Yet, based on his course of study (Automotive Software Engineering) we would assume at least basic skills if not even advanced skills in an object-oriented programming language like Java. A2 claims to have an advanced knowledge in the object-oriented programming languages Java and Objective-C and in the relational database design and manipulation language SQL (Structured Query Language) as well as expert knowledge in languages for web development, including JavaScript, HTML (Hyper Text Markup Language), CSS (Cascading Style Sheets), and PHP (PHP: Hypertext Preprocessor). A3 claims to have an advanced knowledge in the object-oriented programming language Java and the procedural programming language C. Overall the team seems to have sufficient English language proficiency and more than adequate programming skills.

Based on information from personal conversations with the team we learned that A1 and A3 knew each other from common lectures prior to this project. A2 was the new entrance to this social group. In addition, A1 and A3 were both more senior (third semester compared to first semester) with regard to their course of study. This might lead to situation, in which A2 has to convince A1 and A3 of his skills and the value of his opinion. On the other hand, it provides the social group of A1 and A3 with the possibility to acquire new information and alternative viewpoints based on A2's knowledge and previous experience.

The five roles in the team were distributed as follows (see Table 4). A3 was the team leader and took also care of matters regarding technology and development, i.e., decisions regarding the selection of technologies and the development of the mobile applications. A2 assumed the role of the designer, i.e., decisions regarding the screen and interaction design of the mobile application, and partly also the role of the business decision maker, i.e., taking care of the mobile service's profitability. A1 took care of service engineering, i.e., the systematic design and development of the service (Bullinger, Fähnrich, & Meiren, 2003, p. 275), and supported A2 with regard to business decisions.

The personal characteristics of the team are as follows (see Table 4). Regarding the level of self-rated creativity the team exhibits a great variety with levels of self-rated creativity ranging from low (A3) via medium (A1) to high (A2). Therefore, we would assume that A2 is more likely to generate new ideas and that he is more confident regarding the value of his ideas. In addition, the diverse level of creativity might benefit the overall creativity of the team. Creativity is significantly and positively correlated with openness to experience (McCrae, 1987, p. 1263) and diverse levels of openness to experience among team members (i.e., having team members who score low on openness to experience and other who score high) is significantly related to team creativity (Schilpzand et al., 2011, p. 67).

The team members demonstrate a high level of domain-specific personal innovativeness (see Table 4). Two team members (A2 and A3) show a high level of personal innovativeness with IT and the third one (A1) rank also in the upper medium level of personal innovativeness. Therefore, we would assume that the team is open-minded in matters of new ideas and their possible implementation in the area of IT.

The team members exhibit a high (A2) to medium (A1 and A3) level of adult playfulness (see Table 4). A2's comparatively high playfulness score indicates that he is more likely than his teammates to enjoy deviant ideas or ideas that seem to be absurd at first sight. Playfulness has also been shown to correlate significantly and positively with creativity (i.e., the generation of new and useful ideas) and innovation (i.e., the implementation of own ideas as well as the ideas of others) (Bateson & Nettle, 2014, p. 221). Based on theses findings, one could assume that A2 might take on the role of the team's creative leader in matters of the generation of new ideas and/or taking up creative ideas of others. However, the effect of differences in adult playfulness among the team members should not be overrated. To our best knowledge, we are not aware of a study that investigated effects of divers levels of playfulness among team members on team outcomes. Yet, playfulness, which can be thought of as an intellectual act (Proyer & Ruch, 2011, p. 11), has been found to positively affect team cohesion (Bowman, 1987) and promote learning (Kolb & Kolb, 2010, p. 26). In addition, research findings at the individuals' level indicate, for example, that greater playfulness relates to greater divergent thinking capabilities (Lieberman, 1965), improved coping with stressful situations (Magnuson & Barnett, 2013, p. 139) and greater confidence to achieve one's aspirations (Proyer, 2012b, p. 115).

Table 4. Individual characteristics of A2B's team members

Alias	**Role(s) in the team**	**Personal Attributes** [classification (value)]		
		Self-rated Creativity (range: 1 to 9)	**Personal Innovativeness in the Domain of IT** (range: 1 to 7)	**Adult Playfulness** (range: 25 to 175)
A1	Service Engineering; Business	medium (6)	medium (4.50)	medium (99)
A2	Design; Business	high (9)	high (5.25)	high (137)
A3	Team Leader; Technology & Development	low (2)	high (7.00	medium (86)

5.4.2.2 Characteristics of Team 2: TripAssistant

The team TripAssistant consisted originally of two Germans and one Chinese. After one student (X) dropt out of the course the remaining two members (M2 and T2) of that team had to joint one of the other teams. M2, who is also Chinese, joint the team TripAssistant (see Table 3 for an overview of the demographic characteristics). This team was the only mixed-gender team with two males (M3 and M4) and two females (M1 and M2). All team members were almost of the same age. All team members participated in a degree program at the TUM Department of Informatics. Two of them (M1 and M2) studied Information Systems in their third semester and the other two (M3 and M4) studied Informatics in their second semester.

The team members provided the following information with respect to their English language proficiency and their programming language skills. Two team members (M2 and M4) had a good and the other two (M1 and M3) a satisfactory proficiency of the English language. With regard to the optional information of skills in programming languages provided M1 no information. Yet, based on her course of study (Information Systems) we would assume at least basic skills in an object-oriented programming language like Java. M2 claims to have an advanced knowledge in the object-oriented programming language Java as well as a novice knowledge in the object-oriented programming language Delphi and web development, including JavaScript and XML (Extensible Markup Language). M3 claims to have an expert knowledge in the object-oriented programming language Java, advanced knowledge in the object-oriented programming language C# and novice knowledge in the object-oriented programming language Objective-C and the procedural programming language C. M4 claims to have a novice knowledge in the object-oriented programming language Objective-C and an advanced knowledge in the object-oriented programming language Java as well as in web development, including JavaScript, HTML, and CSS. Overall the team seems to have sufficient English language proficiency and more than adequate programming skills.

Based on information from personal conversations with the team we learned that M3 and M4 are friends. They know each other from common lectures prior to this project. In addition, both live in the same area and travel frequently together to the university (for about 30 to 45 minutes) with a car. We noticed also that M1 had often trouble expressing herself in English and that she had only basic German language proficiency. Sometime she talked to M2 in a foreign language that we would assume was their mother tongue Chinese. M2 often helped M1 in understanding the task description or the team's current course of action. Based on the foregoing, we would assume that the team consisted of two social subgroups with M1 and M2 forming one subgroup and M3 and M4 the other. Within the subgroups the members are of the same gender and nationality, speak the same primary language and study the same degree program. Overall, research findings suggest that team diversity in the aforementioned aspects negatively affect team performance and team creativity (Harrison et al., 1998, p. 97; Reiter-Palmon et al., 2012, p. 297).

The five roles in the team were distributed as follows (see Table 5). M1 took over the role as the business decision maker, i.e., taking care of the mobile service's profitability. M2 assumed the role of the designer, i.e., decisions regarding the screen and interaction design of the mobile application. M3 took care of matters regarding technology and development, i.e., decisions regarding the selection of technologies and the development of the mobile applications. M4 was the leader of the team. The team made no statements about who took on the role of the service engineer, i.e., the one who takes care of the systematic design and development of the service.

The personal characteristics of the team are as follows (see Table 5). Regarding the level of self-rated creativity the team exhibits a minor variety of creativity. Two team members (M1 and M3) assume themselves to be slightly less creative than others and therefore are classified as medium creative. The other team members (M2 and M4) assume themselves to be more creative than others and therefore are classified as high creative. Therefore, we would assume that M2 and M4 are more likely to generate new ideas. They might also be more confident

regarding the value of their ideas. In addition, the medium to high level of creativity might benefit the overall creativity of the team.

The team members demonstrate also a medium to high level of domain-specific personal innovativeness (see Table 5). Two team members (M2 and M3) show a high level of personal innovativeness with IT. Whereas the other two (M1 and M4) rank on a medium level of personal innovativeness. Therefore, we would assume that the team is overall open-minded in matters of new ideas and their possible implementation in the area of IT.

All team members exhibit a medium level of adult playfulness (see Table 5) with M2 showing the highest and M3 the lowest playfulness scores within the team. The team's overall medium level of playfulness suggests that the team might not enjoy too deviant ideas or ideas that seem to be absurd at first sight. Playfulness has also been shown to correlate significantly and positively with creativity (i.e., the generation of new and useful ideas) and innovation (i.e., the implementation of own ideas as well as the ideas of others) (Bateson & Nettle, 2014, p. 221). In addition, playfulness can be thought of as an intellectual act (Proyer & Ruch, 2011, p. 11). Moreover, it has also been found to positively affect team cohesion (Bowman, 1987) and promote learning (Kolb & Kolb, 2010, p. 26). Furthermore, research findings at the individuals' level indicate, for example, that greater playfulness relates to greater divergent thinking capabilities (Lieberman, 1965), improved coping with stressful situations (Magnuson & Barnett, 2013, p. 139) and greater confidence to achieve one's aspirations (Proyer, 2012b, p. 115). Therefore, even the only medium level of playfulness might facilitate the team's creative work on the assigned problem.

Table 5. Individual characteristics of TripAssistant's team members

Alias	**Role(s) in the team**	**Personal Attributes** [classification (value)]		
		Self-rated Creativity (range: 1 to 9)	**Personal Innovativeness in the Domain of IT** (range: 1 to 7)	**Adult Playfulness** (range: 25 to 175)
M1	Business	medium (5)	medium (3.50)	medium (105)
M2	Design	high (7)	high (5.00)	medium (109)
M3	Technology & Development	medium (5)	high (4.75)	medium (85)
M4	Team Leader	high (7)	medium (3.75)	medium (97)

5.4.2.3 Characteristics of Team 3: Tripster

The team Tripster consisted originally of one German, one Greek and one Pole. After one student (X) dropt out of the course the remaining two members (M2 and T2) of that team had to joint one of the other teams. T2, who is also Polish, joint the team Tripster (see Table 3 for an overview of the demographic characteristics). This team was also an all-male team. Two of

the team members (T2 and T4) were slightly younger than the average age of the study's participants, one of the team members (T1) was three years older than the average age and the other (T3) was about on average age. This team had the greatest heterogeneity with regard to age diversity with the youngest were 23 and the oldest was 28 years old. Two team members (T1 and T3) participated in a degree program at the TUM Department of Informatics. One of them (T1) studied Information Systems in his fourth semester and the other (T3) studied Informatics in his first semester. Both of the other team members (T2 and T4) were exchange students. They studied computer science in their first semester at the faculty of Computer Science and Management at the Wroclaw University of Technology with a specialization in software engineering. During their semester abroad, they participated amongst other courses in the "Advanced Practical Course: Automotive Services" at TUM.

The team members provided the following information with respect to their English language proficiency and their programming language skills. All team members had a good proficiency of the English language. With regard to the optional information of skills in programming languages the team members provided the following information. T1 claims to have an advanced knowledge in the object-oriented programming language Java as well as a novice knowledge in the object-oriented programming language C++ and the procedural language C. In addition, he claims to have knowledge in web development, including novice skills in JavaScript and PHP as well as advanced skills in HTML and CSS. T2 claims to have advanced knowledge in the object-oriented programming languages Java, C++ and C# as well as in the procedural programming language C and in the script language for web development JavaScript. T3 claims to have advanced knowledge in the object-oriented programming languages Java and C++ as well as in the procedural programming language C. T4 claims to have expert knowledge in the object-oriented programming language C#, advanced knowledge in the procedural programming language C, and novice knowledge in the object-oriented programming languages Java and C++. Overall the team seems to have sufficient English language proficiency and more than adequate programming skills.

Based on information from personal conversations with the team we learned that T2 and T4 are friends and also knew each other from common lectures and projects prior to this project. In addition, both were on their semester abroad, and thus, foreigners in Munich. They participated also in German lectures to improve their medium level German proficiency. Therefore, it could happen that they might form a subgroup within the team. Similar to team TripAssitant, the demographic diversity of the team might have a negative affect on the team's performance and creativity (Harrison et al., 1998, p. 97; Reiter-Palmon et al., 2012, p. 297).

The five roles in the team were distributed as follows (see Table 6). T1 took over the role as the business decision maker, i.e., taking care of the mobile service's profitability. T2 took care of matters regarding technology and development, i.e., decisions regarding the selection of technologies and the development of the mobile applications. T3 was the team leader and took also care of systematic design and development of the service in the role of the service engineer. T4 took over the role as the designer, who is among other things responsible for decisions regarding the screen and interaction design of the mobile application.

The personal characteristics of the team are as follows (see Table 6). Regarding the level of self-rated creativity the team exhibits, similar to team TripAssistant but with a slightly greater variety, a minor variety of creativity. Two team members (T1 and T3) assume themselves to be less creative than others and therefore are classified as medium creative. Yet they rank on the lower boundary of medium creativity. The other team members (T2 and T4) assume themselves to be more creative than others and therefore are classified as high creative. Therefore, we would assume that T2 and T4 are more likely to generate new ideas. They might also be more confident regarding the value of their ideas. Yet again they rank on the lower boundary of the classification. Similar to team A2B it could be argued that the diverse levels of the team members' creativity might benefit the overall creativity of the team. Creativity is significantly and positively correlated with openness to experience (McCrae, 1987, p. 1263) and diverse levels of openness to experience among team members (i.e., having team members who score low on openness to experience and other who score high) is significantly related to team creativity (Schilpzand et al., 2011, p. 67). However, the variety and diversity of team's creativity levels is not as strong as among the members of team A2B.

The team members demonstrate a medium to high level of domain-specific personal innovativeness (see Table 6). Two team members (T3 and T4) show a high level of personal innovativeness with IT. T2 ranks on an upper medium level and T1 on a medium level of personal innovativeness. Therefore, we would assume that the team is overall open-minded in matters of new ideas and their possible implementation in the area of IT.

Table 6. Individual characteristics of Tripster's team members

Alias	**Role(s) in the team**	**Personal Attributes** [classification (value)]		
		Self-rated Creativity (range: 1 to 9)	**Personal Innovativeness in the Domain of IT** (range: 1 to 7)	**Adult Playfulness** (range: 25 to 175)
T1	Business	medium (4)	medium (3.00)	medium (106)
T2	Technology & Development	high (7)	medium (4.50)	medium (95)
T3	Team Leader; Service Engineering	medium (4)	high (5.25)	medium (105)
T4	Design	high (7)	high (5.50)	medium (104)

All team members exhibit a medium level of adult playfulness (see Table 6). T1, T3 and T4 show a very similar level of playfulness that is slightly higher compared to T2's playfulness score. The team's overall medium level of playfulness suggests that the team might not enjoy too deviant ideas or ideas that seem to be absurd at first sight. In addition, this would suggest that no member of this team has a particularly high inclination to reframe situations in a way that provides themselves and maybe also others with fun, humor and enjoyment (Barnett, 2007, p. 955). Yet, playfulness has been shown to correlate significantly and positively with

creativity (i.e., the generation of new and useful ideas) and innovation (i.e., the implementation of own ideas as well as the ideas of others) (Bateson & Nettle, 2014, p. 221) and has been found to positively affect team cohesion (Bowman, 1987) and promote learning (Kolb & Kolb, 2010, p. 26). In addition, playfulness can be thought of as an intellectual act (Proyer & Ruch, 2011, p. 11). Furthermore, research findings at the individuals' level indicate, for example, that greater playfulness relates to greater divergent thinking capabilities (Lieberman, 1965), improved coping with stressful situations (Magnuson & Barnett, 2013, p. 139) and greater confidence to achieve one's aspirations (Proyer, 2012b, p. 115). Therefore, even the mere medium level of playfulness might facilitate the team's creative work on the assigned design problem.

5.4.2.4 Distribution of the Personal Attributes at the Team-Level

Again, due to the small number of individuals and teams in this study the results are not eligible to draw conclusions about team performance or team creativity based on the characteristics of the teams' demographic diversity or differences in their personal attributes or the distributes of those values within the teams. Yet, the aforementioned description of the characteristics of the three observed teams as well as the overview of the distribution of personal attributes at the team-level in this section might help in the interpretation of the observed phenomena. In addition, the collected data can be brought in relation to findings of other research studies and thereby lend support to those findings or show contradictions. Overall, the information collected about the teams' as well as the individuals' characteristics add to the richness of the data for our grounded theory study (cf. Charmaz, 2014, p. 23).

We calculated the personal attributes at the team-level as the mean of the individual team members' values. In addition, we provide the standard deviation (SD) to indicate the variation of the respective personal attribute among the team members. Table 7 provides an overview of the team-level distribution of the surveyed personal attributes.

The aggregation of the individual team members' personal attributes on the team-level demonstrates the relatively high homogeneity of the three teams. All teams rank on a medium level of their members' self-rated creativity as well as on adult playfulness. The teams TripAssistant and Tripster rank also on a medium level of personal innovativeness in the domain of IT. Only team A2B demonstrates a high level of personal innovativeness on the team-level.

The teams' mean values of self-rated creativity are slightly above the scale's median indicating that the teams perceive themselves overall as marginally more creative than others (see Table 7). As shown above, the team members' individual perception of their creativity varies within and across the teams. Overall, TripAssistant shows the highest creativity value with the lowest variation among its team members. A2B, on the other hand, exhibits only a slightly lower creativity value but demonstrates a greater variation of the creativity levels among its team members. As argued above based on findings by McCrae (1987, p. 1263) and Schilpzand, Herold and Shalley (2011, p. 67), a greater variation of creativity among the members of a team might lead to a higher creativity of the team's outcome.

With a greater domain-specific personal innovativeness among its members team A2B might also exhibit more relevant knowledge on innovative developments in the area of IT. In addition, the instrument that was used to assess this personal attribute (see also chapter 5.5.2.3 for a description of the used questionnaire) asks among others the following two questions: (1) “If I heard about a new information technology, I would look for ways to experiment with it” (Agarwal & Prasad, 1998, p. 210) and (2) "I like to experiment with new information technologies" (Agarwal & Prasad, 1998, p. 210). Stating a stronger agreement with those statements indicates also an individual’s greater propensity to engage in explorative activities. Exploration is concerned with “[…] gaining new information about alternatives […] (March, 1991, p. 72), and thus, is a variance-creating strategy for learning (McGrath, 2001, p. 119). This strategy has been found to be beneficial in uncertain settings, including innovation (Cheng & van de Ven, 1996, p. 593) and new product development (Eisenhardt & Tabrizi, 1995, p. 104). Therefore, a team that exhibits greater tendencies to explorative behavior might also generate more ideas and consequently has to exclude more ideas because of time constrains for the implementation of those ideas during a project’s duration.

All teams rank on a medium level of adult playfulness (see Table 7). This might facilitate the aforementioned possible positive effects of playfulness on relevant aspects of team creativity and performance, including openness to creative and innovative ideas (Bateson & Nettle, 2014, p. 221), team cohesion (Bowman, 1987), learning (Kolb & Kolb, 2010, p. 26), divergent thinking (Lieberman, 1965), coping with stress (Magnuson & Barnett, 2013, p. 139) and the confidence to achieve one’s aspirations (Proyer, 2012b, p. 115). In this respect even a medium level of playfulness might facilitate those positive effects. Yet, as many other factors also influence team creativity (Paulus et al., 2012; Paulus & Nijstad, 2003; West, 2003) and team performance (Guzzo & Dickson, 1996; Guzzo & Shea, 1992) we might not gain conclusive insights on how adult playfulness affects teams. This applies in particular as we only have teams with a medium level of playfulness. More interesting effects might be observed when comparing teams, which rank on the extreme ends of playfulness, i.e., comparing teams that show a very low level of playfulness with those that show a very high level of playfulness. However, with reference to the findings of Schilpzand, Herold and Shalley’s (2011) study on the relation of openness to experience and team creativity it might be interesting to see whether a greater variation of individual playfulness within a team (for example as exhibited by team A2B) leads to similar results. The number of individuals and teams that we investigate in this study is, however, too small to lead to generalizable results in this respect.

Table 7. Overview of team-level distribution of personal attributes

Team	**Personal Attributes** [classification (mean value | standard deviation)]		
	Self-rated Creativity (range: 1 to 9)	**Personal Innovativeness in the Domain of IT** (range: 1 to 7)	**Adult Playfulness** (range: 25 to 175)
A2B	medium (5.67 | 2.87)	high (5.58 | 1.05)	medium (107.33 | 21.64)
TripAssistant	medium (6.00 | 1.00)	medium (4.25 | 0.64)	medium (99.00 | 9.17)
Tripser	medium (5.50 | 1.50)	medium (4.56 | 0.97)	medium (102.50 | 4.39)

5.4.3 The Teaching Team

The teaching team consisted of a lecturer (L) and two teaching assistants (TA). The lecturer is a post-doctoral researcher, senior lecturer, and head of a research group at the Chair for Information Systems at TUM. In 2009, he received his doctoral degree in Information Systems from TUM. He has an extensive teaching experience and taught the "Advanced Practical Course: Automotive Services" each semester since the winter term 2010/2011. In the observed case he conducted it for the seventh time. Both teaching assistants hold a master degree in Information Systems and work as research associates in the lecturer's research group at the Chair for Information Systems at TUM. The first teaching assistant (TA1) conducted the advanced practical course for the fifth time and the second teaching assistant (TA2) for the second time.

In addition to his role as teaching assistant in the observed instance of the "Advanced Practical Course: Automotive Services", TA1 is also the principal researcher of this study. This double role made the close observation of the participants possible. Although the participating students were aware of TA1's double role, we found no indication of confounding effects. The participants' behavior was not different from those of previous courses. In addition, the participants did not know the exact subject of the study until after the debriefing at the end of the course. They were only told that the study is about team's behavior during instances of idea generation and prototyping (cf. appendix A).

5.4.4 The Corporate Partner: RE'FLEKT GmbH

The corporate partner for the observed instance of the "Advance Practical Course: Automotive Services" was RE'FLEKT GmbH[8]. The award-winning company is based in Munich and was incorporated in June 2012 as a corporate spin-off of Kreativagentur Thomas GmbH, which is, according to a press release, one of Europe's leading Augmented Reality (AR) agencies (Thomas, 2012). RE'FLEKT conducts research and development on augmented and virtual reality technologies, provides consulting services regarding AR applications for the automotive industry, manufacturing and real estate companies. Since April 2015 it offers also an AR software platform for the efficient creation of industry applications.

Two employees of RE'FLEKT acted as a contact for the teams and provided feedback at the 2nd idea presentation and the interim presentation. The Corporate Communications Manager was the business contact and the Director Augmented Production was the technical contact. In addition, the Chief Technology Officer and founder of RE'FLEKT participated as a member of the jury in the final presentation.

The company's corporate communication manager named in a personal conversation the following reasons for RE'FLEKT's participation in the advanced practical course. First, RE'FLEKT is working in a highly innovative and fast moving market, in which continuous learning is an imperative. Employees of the company therefore seek on a regular basis the

[8] http://www.re-flekt.com/en/

exchange of knowledge with universities and research institutes. Second, ideas of students and researcher serve as a source of inspiration for the possible application of AR. Third, it enables employees to refresh and enhance their knowledge about the utilization of scientific methods and rigor in their application. Fourth, through the participation as corporate partner in an advanced practical course at the TUM Department of Informatics they can share their knowledge about AR with students and researcher. This might lead to further cooperation in research projects with the university. Finally, it helps also in making students aware of RE'FLEKT as an attractive employer for working students, internships or after graduation (Schart, 2015).

RE'FLEKT was a valuable corporate partner for our study. The company offered a combination of the entrepreneurial spirit of a start-up and the domain expertise of a leading company in the respective field. Consequently, the student teams received feedback from people, who (1) had experience in the development of innovative mobile applications, (2) were knowledgeable in the requirements of founding a start-up and (3) had proficiency in selling ideas for innovative solutions to potential customers and partners.

5.4.5 Overall Structure of the Projects

The observed projects followed the course of events outlined in Figure 2. The projects started with the kickoff meeting on October 23rd. At the kickoff the teaching team announced the overall project assignment and explained the intended course of action. In addition, the participants formed teams and took part in a short teambuilding event. The teams carried out seven assignments, presented their initial idea as well as a refined version of their idea and conducted five team meetings in the seven weeks between the kickoff meeting and the interim presentation. The teams participated in a workshop on augmented reality technologies after the 2nd idea presentation. Two employees of the corporate partner organized the workshop, in which they explained and demonstrated several potential uses of AR and gave an introduction to a software development kit (SDK) for AR applications. The teams presented their proposed solution in the interim presentation. After this presentation, the teams had time to implement the prototype and advance their proposed solution as well as the requested deliverables until the final presentation on March 19th. The hand over of the complete project results was due to March 24th.

The first part of the project, that is, until the interim presentation, comprised mainly activities regarding idea generation and elaboration. The second part comprised mainly activities with respect to the realization of the proposed solution. The following sections provide a comprehensive description of the individual tasks and activities of the observed case. This is necessary to understand the context, in which the teams operated.

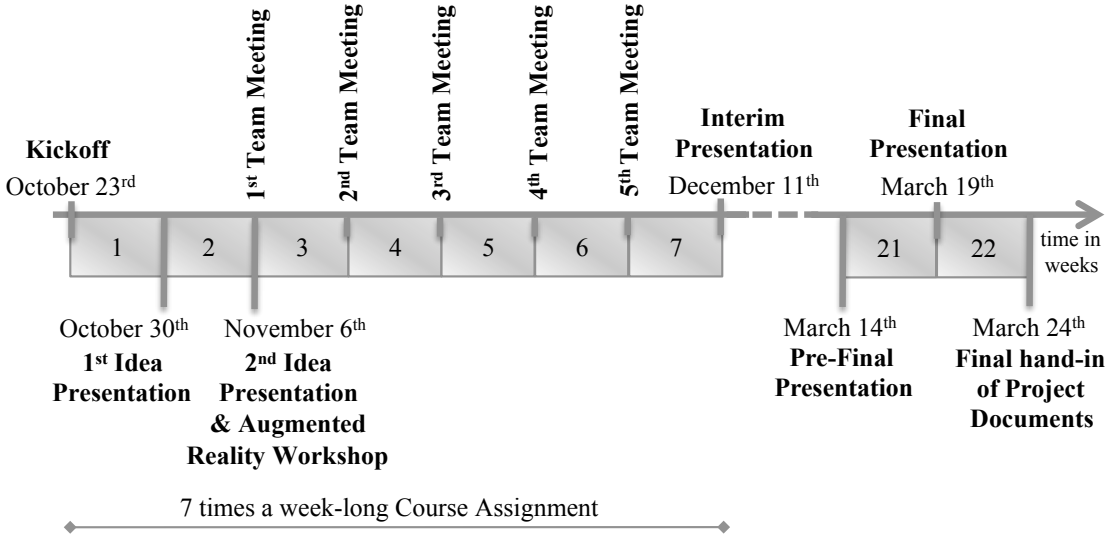

Figure 2. Outline of the course of events of the observed case
(Source: Own illustration)

5.4.5.1 Kickoff for the Ideation Phase and Team-Building Activity

On the first appointment, the lecturer introduced the challenge and the deliverables of this course to the students. Afterwards, the students had time for self-selecting their team members and to form 4 project teams with 3 members each. The only requirement of the researchers regarding the team formation was that the students should ensure to have a balanced set of skills with regard to software and service engineering, design and economics (cf. Lakhani & Panetta, 2007). The fact that the students took part in a university course with course credits as incentive for their joint performance should incentivize that the project teams build functioning work teams (Barry & Stewart, 1997, p. 67; Schilpzand et al., 2011, p. 64).

As a first step for team-building and to motivate rapid prototyping and testing of assumptions the students participated in teams of three in an activity called „The Marshmallow Challenge“ (Wujec, 2010). The task of this challenge is to build within eighteen minutes the tallest freestanding structure that can hold a marshmallow on top of it. The available materials for building the structure are 20 sticks of spaghetti, one meter of tape, and one meter of string. According to Tom Wujec (i.e., the inventor of the marshmallow challenge) it is „a remarkably fun and instructive design exercise that encourages teams to experience simple but profound lessons in collaboration, innovation and creativity“ (Wujec, 2010).

We used this activity already in previous instances of this course and each time got an affirmative feedback from participants. This time, however, the team constellation (four teams with three team members) changed slightly after the team-building activity because one of the students dropped out of the course. Hence, the remaining two members of this team joint each one of the three remaining teams. This was necessary because we knew from experience of past instances of this course that the required overall course assignment is too extensive to be carried out be only two students. Figure 3 shows the team composition before and after the necessary reformation of the teams after the drop out of the student (with the alias X). The

students M2 and T2 could choose themselves which of the remaining three teams they want to join.

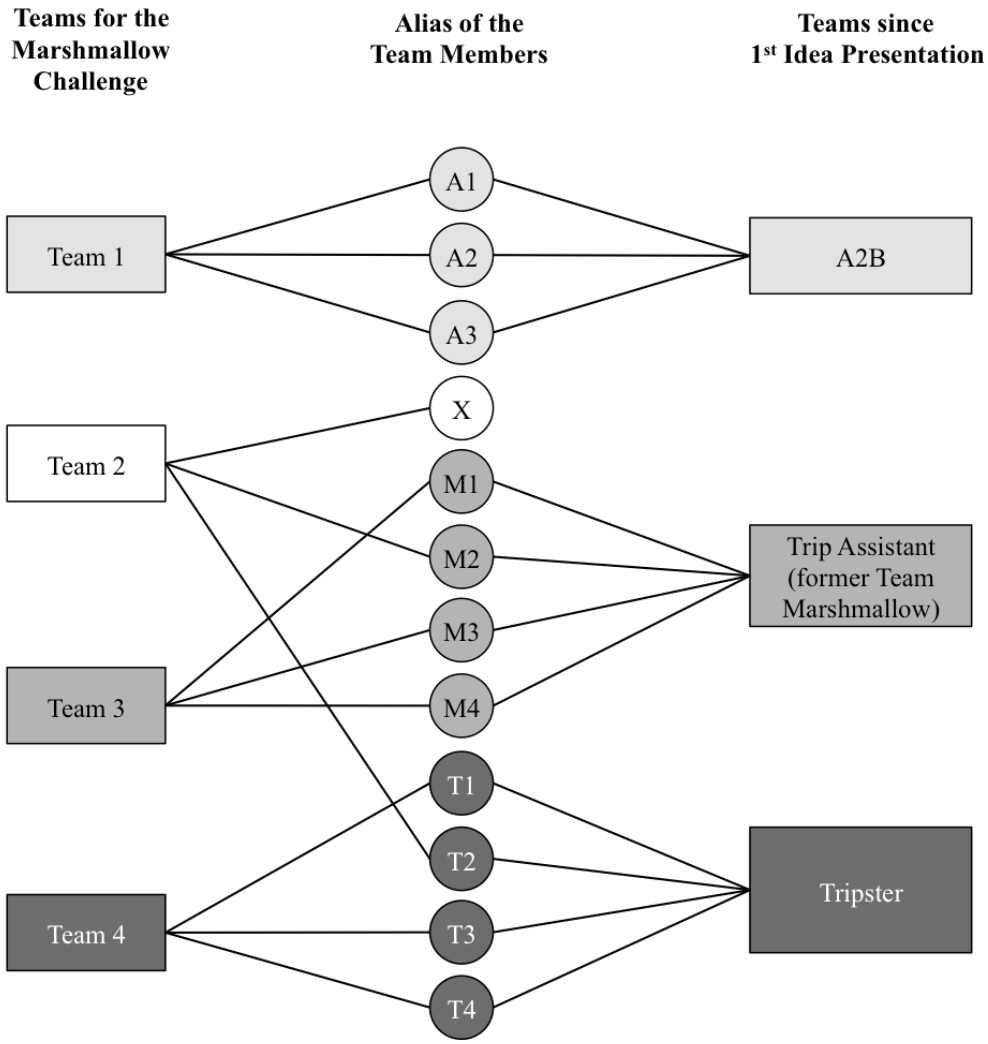

Figure 3. Overview of the team composition in the Marshmallow Challenge and the assigned course project
(Source: Own illustration)

5.4.5.2 The seven Assignments and their Purposes

This chapter describes the seven assignments that the teams completed during the first seven weeks of the project. The teams had one week to complete each of the assignments. Carrying out assignment two to four prepared the teams for the task in the subsequent team meeting (see section 5.4.5.4 for a description of the tasks). The assignments one got the teams ideation process started and required the creation of their first team presentation. The assignments five to seven addressed different parts in preparation for the interim presentation (see section 5.4.5.3 for a description of the presentations).

The **1st assignment** was intended to familiarize the teams with the topic of the challenge. They should identify concrete problems of travelers on business trips and develop initial proposals for a solution. In addition, the teams were asked to prepare a five-minute presentation for the next appointment, i.e., the 1st idea presentation.

The **2nd assignment** was intended as the preparation for the task of the first team meeting. The teams were required to answer questions about the (1) service offering, (2) customer, (3) problem addressed, and (4) the originality of the proposed solution. The answers to theses questions provided input for the next meeting task, in which the teams were asked to phrase a one-sentence pitch (see also the description of the meeting task in section 5.4.5.4). Again, the teams were asked to prepare a five-minute presentation for the next appointment, i.e., the 2nd idea presentation.

The **3rd assignment** was intended as the preparation for the task of the second team meeting. The first task was to create a character profile for their target audience. The teams were asked to apply user-centered design methods to identify important characteristics and develop a sound understanding of their users. The character profile should be created according to the d.school's[9] (2010, p. 21) "Fill-In-The-Blank Character Profile", which explains the method and provides a template for a character profile. The content of the character profile should either be the description of a real person based on an interview or a composition of the typical characteristics of a potential user. Therefore, the teams were introduced to two additional methods that should help them with the important step of understanding their potential customers' needs. First, the method "Interview for Empathy" (d.school, 2010, p. 13) provides a guide for the conduction of interviews. Second, the five-step process for the identification of customer needs (Ulrich & Eppinger, 2008, pp. 56-69) provides guidelines for the elicitation and use of information about user needs in product development projects. In addition, the teams were asked to distinguish, if necessary, between the customer (i.e., the person or company who buys the service) and the user (i.e., the person who actually uses the service) (cf. Osterwalder, 2010). Furthermore, the teams were introduced to the customer activity cycle (cf. Vandermerwe, 2000, p. 31) to survey what business travelers do pre, during and post a business trip. The teams were encouraged to think about possibilities to support the business travelers during these activities.

The **4th assignment** was intended as the preparation for the task of the third team meeting. The teams had to create at least 50 user stories. Then select the ten most important user stories and provide the rationale for their selection. According to Cohn (2004, p. 4) a user story is a description of a functionality that might be useful for a user of a system or service. Consequently, the teams should use the user stories to identify the most important user requirements and think about how they could realize those requirements in their mobile applications. The concept of user stories was introduced in a lecture. In addition, the teams received a book (see ThoughtWorks, 2013) on user stories in agile software projects for

[9] The d.school is the Hasso Plattner Institute of Design at Stanford. It teaches design thinking methods and provides with the "d.school bootcamp bootleg" a useful guide to the application of user-centered design methods (d.school, 2010, p. 2).

further guidance. Furthermore, the teams learned about the method "Identify a Variable" (d.school, 2010, p. 41) for the selection of functions and variable that are worth to prototype.

The **5th, 6th and 7th assignments** were intended as a preparation for the interim presentation. First, the teams were introduced to the creation of a promotional video, which explains their overall proposed solution in a compelling way. Even though the team can demonstrate the main idea of their solution through a prototype of the mobile application, the communication of interactive, location-based services to a diverse set of stakeholders is challenging. Wrapping the demonstration of the proposed solution in a concise and compelling story and communicate it through a short video film is a well-tried way for the communication with stakeholders, which even helps to overcome language and cultural barriers (Brown & Wyatt, 2010, p. 35). The methodical guidance was provided by the two method descriptions "Video Shooting" (d.school, 2010, p. 46) and „Video Editing" (d.school, 2010, p. 47). The task of the 5th assignment was to create a short video of about 2 minute for the promotion of the mobile application. The aim of the video was to vividly present the proposed solution and to inspire others to support its development.

Second, a business model is an important tool for a business because it explains how a company works (Magretta, 2002, p. 87). That is, a business model concept explicates the logic of how a company creates value (Osterwalder, Pigneur, & Tucci, 2005, p. 12). It describes the customers, the offering as well as the activities and partners necessary, and the financial aspects in terms of costs structures and revenue models (Osterwalder et al., 2005, p. 18). The 6th assignment asked the teams to develop a business model for their proposed mobile application. Therefore, the teams were introduced to the Business Model Canvas and the process of business model generation according to Osterwalder and Pigneur (2010, pp. 12-51). In addition, the teams should also think about the market potential of their mobile application and their competitors.

Finally, the teams had to prepare a presentation in a format as if they would pitch their ideas to venture capitalists. The team's objective of the interim presentation was to sell their project (cf. Kanter, 1988, p. 173). The interim presentation was framed as a gate that separates the idea generation phase from the implementation phase. The teams were asked to get the corporate partner exited about their projects, convince them that it is a useful project that solves a relevant problem and is worth spending additional three months on the implementation of their proposed solution.

5.4.5.3 The five Presentations

The teams presented for the first time their joint findings at the **1st idea presentation**. They received feedback on their ideas from both teaching assistants and a research associate of the Chair for Information Systems, who has conducted the advanced practical course together with TA1 in the previous years. Overall, the feedback was constructive and indicated ways to improve the ideas.

In their **2nd idea presentation** the teams presented their idea for an innovative digital services to two employees (the corporate communications manager and the director augmented production) of the corporate partner RE'FLEKT, the two teaching assistants, a research

associate of the Chair for Information Systems, who has participated in 2011 as a student in this course, and the other teams. All teams received critical feedback from the audience. Especially the feedback from RE'FLEKT helped the teams to get a better understanding of the business demands and considerations from a company's point of view.

The **interim presentation** was the third time at which the teams jointly presented the current version of their digital service and the respective mobile application. The teams were asked to create a slide deck that was suitable to make an investment decision. They were also encouraged to show a promotional video as well as mockups or a prototype of their mobile application. Again, the teams received critical feedback from the two employees of RE'FLEKT, the two teaching assistants, the research associate, who was also present at the 2nd idea presentation, and the other teams. Although the presentation marked the official end of the idea generation phase, the teams were also encouraged to advance and refine their proposed solution until the end of the project. In addition to the verbal feedback after each of the three presentations the two teaching assistants compiled this time also a written feedback for each of the teams. The written feedback summarized the verbal feedback from the audience. In addition, it highlighted shortcomings of the presentation as well as the presented proposed solutions and gave advice on how to overcome these shortcommings.

The fourth presentation was a **dry run for the final presentation** and was held shortly before the final presentation. Again, the teams were asked to create a slide deck that was suitable to make an investment decision. The slide deck should include details on the business model, the potential market and the technical aspects of the product. The teams should also include their promotional video as well as a demonstration of their prototype in the presentation. The teams received critical feedback and advice from the lecturer, the two teaching assistants, and the other teams. The feedback addressed the way in which the teams presented their results, the media used for the presentation, and the content of the presentation.

The fifth presentation was the actual **final presentation** and was held at the office of RE'FLECT. The teams were urged to incorporate the feedback from the previous presentation and present an improved version of their pre-final presentation. The objective was to sell the results of the teams' projects in the best possible way. It was announced that a jury rates the presentations as well as the presented ideas and that the best team wins a prize, which was sponsored by RE'FLEKT. The jury consisted of three members: (1) the research associate from TUM, who participated in the 2nd idea presentation and the interim presentation, (2) the Chief Technology Officer (CTO) and founder of RE'FLEKT, and (3) a technology journalist, who is an editor at the German computer magazine Macwelt and has a special interest on mobile applications.

5.4.5.4 The Tasks of the Five Videotaped Meetings

The five videotaped team meetings took place within the first seven weeks of the project, which constituted the projects' ideation phase. The team meetings took place each Wednesday for five consecutive weeks. The first videotaped meetings took place after two weeks. At this time the teams had already held their 1st idea presentation and worked on two assignments. Thereby, they got to know each other and acquired knowledge about the topic of

their project. The last videotaped meeting took place one week before the interim presentation, which marked the end of the ideation phase.

All team meetings were held in the same room due to the resource constraints for video recording and working space. Only one team was present at a time. The respective time slots (see Table 8) were aligned with the time constraints of the teams. The teams were required to fulfill a certain task in each meeting. The teaching assistant (TA1), who conducted this research study, introduced each of the five tasks to the teams. He also set up the video and audio recording of the meeting. After the meeting, one or two of the teaching assistants discussed the team's solution with the team. TA1 was always present. The role of the teaching assistants was that of a mentor, i.e., they gave the team advice on how to proceed and suggested ways to improve the team's proposed solution.

Table 8. Overview of the time slots for the team meetings

Team	1st meeting (Nov. 6th)	2nd meeting (Nov. 13th)	3rd meeting (Nov. 20th)	4th meeting (Nov. 27th)	5th meeting (Dec. 4th)
A2B	1 p.m. to 2 p.m.				
TripAssistant	2:30 p.m. to 3:30 p.m.				
Tripster	10 a.m. to 11 a.m.	4 p.m. to 5 p.m.		10 a.m. to 11 a.m.	

At large, the procedure for holding the meetings and collecting the data was the same for each of the videotaped meetings. First, the teaching assistant (TA1) started the video and audio recording. Then he welcomed the team members, introduced the task for this meeting, answered the team's questions, wished the team a lot of fun in performing the task and left the room. Second, the teams worked on the task. All three teams performed the same task on the same weekday, but, as mentioned before, at different times of the day due to limited resources for the video recording and working space (see Table 8). The teams had about 45 minutes to complete the required task. Afterwards TA1 came back into the room and discussed the solution with the students. Third, the students completed a short questionnaire (see section 5.5.3 for a description of the questionnaire) that surveyed the individuals' perception of the meeting.

In the following, we describe each of the five tasks that the teams approached in the videotaped meetings. In addition to the description of the task, we provide also the motivation for each of the meeting tasks.

Task 1 – One-Sentence Pitch

In the first team meeting that was video recorded, the teams had to create a one-sentence pitch according to the template by Adeo Ressi, Founder & CEO of the Founder Institute[10]. The template is shown in Figure 4. It was handed to the teams at the beginning of the team

[10] https://fi.co/about

meeting. Each team member got a one-page document with a short rationale for the necessity of a concise one-sentence pitch, the template as shown in Figure 4 and an explanation of the template's four main items (offering, audience, problem and secret sauce).

Figure 4. The Founder Institute's one-sentence pitch template
(Source: Ressi (2013))

The teams got 30 minutes for this task. Prior to this meeting, all teams identified and presented unsolved problems of business travelers on business trips (cf. 1st assignment and 1st idea presentation) and generated an initial proposal for a solution (cf. 2nd idea presentation). In addition, they had prepared possible solutions for the single items of the template in their 2nd assignment, in which they were asked to find answers to the following four questions: (1) What is your offering / what is your service about? (2) Who is your customer? (3) What problem do you solve? (4) In what respect is your solution superior to existing ones?

The rationale for this task is based on research findings, which suggest that achieving a shared understanding is critical for the successful collaboration in work groups and teams (e.g. Bittner & Leimeister, 2014; Møller & Tollestrup, 2013; Vlaar et al., 2008). In addition, based on our experience at AUDI AG, the precise formulation of a proposed innovative solution is an obligation in order to get founding for the subsequent elaboration of the idea. Moreover, the development of a concise statement about a topic as demanding and ambiguous as an ill-conceived initial idea for a digital service (Bullinger, 2008, p. 11; Goh et al., 2013, p. 164) was intended to invite the team members in discussion about their individual understandings. Becoming aware of the different interpretations is important in collaborative innovation attempts as it might foster the joint creation of a novel understanding (Lane & Maxfield, 2005, p. 10; Vlaar et al., 2008, p. 244). Furthermore, phrasing a concise sentence that include the problem addressed, the target user group, the proposed solution as well as its originality requires a combination of divergent and convergent thinking activities (Woodman et al., 1993, p. 299). The majority of the divergent thinking activities should have taken place during

the teams' work on the 2nd assignment, which was intended to acquire the necessary information (cf. Guilford, 1959, p. 470; O'Quin & Besemer, 2011, p. 273). The purpose of the meeting was then to deduce a single solution that states the team's business idea (cf. Drago & Heilman, 2012, p. 606; Guilford, 1959, p. 470).

Task 2 – Persona and User Journey

In the second meeting, the teams were asked to create a persona of the typical business traveler who might use their mobile application and a user journey on how he or she might use the application, including his or her experiences and feelings. Therefore, the teams should build on their results from the 3rd assignment, in which they created a character profile for their target audience (see chapter 5.4.5.2). The task was split into two main parts. The teams could reuse large parts of the third assignment's results for answering the first task. Therefore, they were told to spend only about ten minutes on this task. The second task was to create a user journey. That is, a high-level description of how the persona would use the team's proposed solutions. Overall, the teams had 45 minutes for the completion of both tasks. The tasks were explained by TA1 at the beginning of the meeting. In addition, the teams received five sets of teaching aids, which provided a brief description of the task as well a space for the tasks' results.

In the first part of this meeting, the teams addressed the first task. They had to create a persona (i.e., a fictional character that describes the personal characteristics of a certain type of user along with important behavior patterns, goals, attitudes and environmental factors). In addition, they had to describe the important pain points that this persona faces regarding mobility on a business trip (e.g., giving a taxi driver directions in a foreign language to a meeting location that does not have a well known address) and what strategies might help this persona to achieve his or her goals (e.g., a map that shows the exact location to which the business traveler has to travel for his or her meeting).

In the second part of this meeting, the teams addressed the second task. They had to create a user journey, in which they describe the usage and usefulness of their proposed solutions as a compelling story. The proposed solution was for each team a mobile application, which they intended to build in order to offer a valuable service for business travelers on a business trip. The teaching aids for this task provided also a brief guidance for the creation of a user journey. The teams should use the persona, which they had created in the pervious task, show their solution in the relevant context, describe the proposed solution in a visual form, make the user's journey dramatic (action, conflict, transformation) and describe the user's emotions and experiences. As additional support for the creation of a compelling story, the teams were introduced to the design thinking method "Storytelling" (d.school, 2010, p. 41). They received the description of this method also as a printout in order to use it as a reference during the work on the task.

The intention for the first task was that the teams should engage in thinking about the requirements of a user and how he or she might use the application. In previous instances of the university course, we found that the teams often tried at first to address their own problems without thinking of the actual target audience. In organizations, however, innovation teams rarely work on solving their own problems but rather create innovative

solutions to a client's problem. Therefore we introduced the teams to the interaction design tool of creating a persona. A persona is a description of a hypothetical archetype of actual users and their wishes (Cooper, 2004, p. 123). A persona provides a specific description of the target audience in form of a single person. This should provide the teams with the necessary focus for developing a valuable solution for a certain kind of business traveler.

The motivation for the second task was that stories are a proven tool that helps communicate an idea or a solution to stakeholder outside the team (Brown & Wyatt, 2010, p. 35). Stories are a central aspect of human cognition; they are an important part in child development as well as in human's exchange and consolidation of knowledge (Beckman & Barry, 2009, p. 152). For the communication of the final solution, the teams therefore are required to create a short video that explains their application in an informative but also compelling way. On this account, the teams should train their storytelling capabilities in this meeting. In addition, storytelling can lead to new insights about the user's problem or possible solutions (Beckman & Barry, 2009, p. 155). The collaborative creation of a user journey might therefore lead to the identification of new features worth integration in the team's intended mobile application. Then again, the user journey could also reveal a feature that the team previously deemed relevant, which proves now to be irrelevant and thus should be excluded.

Task 3 – Prototyping: One Joint Solution

In the third meeting, the teams were asked to collaboratively create a low-fidelity prototype of their mobile application in form of simple screen mockups. This simple form of a prototype can be created, for example, with paper and pencil and shows a general flow through an application's screens (Rudd, Stern, & Isensee, 1996, p. 78). In this meeting, the team worked on a whiteboard as shared drawing area for the design of the mockups. The team had 45 minutes for the completion of this task.

The teams should thereby focus on the most relevant features of their proposed solution, i.e., the parts of the application that might create a value for the user. Thus, screens such as a login screen or a screen to specify the applications settings could be ignored as long as they are not central delivery of the service. To support the selection of the relevant aspects of the mobile application, the teams created in their 4th assignment user stories and selected the most relevant ones in preparation for this meeting.

The rationale for this task was that the teams should engage in collaborative sketching activities. The shared drawing space should mediate the interaction of the team, for example, by directing the teams attention during the discussion of a relevant feature through pointing actions to the external representation of that feature (Tang, 1991, p. 149). The physicality of the interaction as well as the lesser technical demands and constraints compared to computer-based prototyping should foster the innovativeness of the team members (Schlachtbauer et al., 2013, p. 2). In addition, thinking with the aid of an external representation should help the team "[…] to think the previously unthinkable" (Kirsh, 2010, p. 441). They should engage in interactive processes in which they discuss, alter and refine their proposed solution. Thereby, the sketchily representation of ideas on a whiteboard should foster the interactive process of reflective thinking, share thoughts with others and elicit new ideas. Overall, the orientation of the task involves divergent as well as convergent thinking. The selection of the relevant user

stories and the creation of a single solution required the team members to engage in convergent thinking. The generation and discussion of alternative solutions for sketching the screen mockups, however, allowed also divergent thinking. Therefore, the teams might need to deal with conflicts that arise when team members are in thinking modes with opposed goals, i.e., selection and consolidation of existing ideas versus the generation of new ideas.

Task 4 – Prototyping: Several Individual Solutions

In the fourth meeting, the teams were asked again to engage in low-fidelity prototyping. First, the team members should discuss and collaboratively define the core feature of their services, i.e., the functionality that provides a distinctive service for the target audience. Second, each team member should create several different solutions for realizing this feature. Thereby, they should rapidly create several different prototypes with paper, pencil, scissors and/or post-its or by drawing screen mockups on the whiteboard. The intended outcome was a collection of many rough, throwaway prototypes that represent the individual team member's thoughts and ideas with regard to the joint solution. The ideas should be brought to life in form of rough sketches, low-fidelity prototypes or role-plays. The goal was that the team members create a pool of solution components, engage in lively discussions about alternative solutions, test their ideas and improve the overall solution through the combination of different ideas. Each team had 45 minutes for the completion of this task.

At the beginning of the meeting, the teaching assistant introduced the teams to the four ground rules for group brainstorming according to Osborn (2008, p. 53): (1) focus on quantity, (2) withhold criticism, (3) welcome unusual ideas, and (4) combine and improve ideas. As the task required this time mainly divergent thinking, the teaching assistant invited the teams to take part in a brief warm-up exercise called "30 circles" (Kelley & Kelley, 2013). For this exercise, the participants were equipped with a pen and a piece of paper with 30 blank circles (five columns and six rows of adjacent circles with circa three centimeters in diameter). The task was to turn as many of the blank circles into recognizable objects. Possible solutions would be, for example, a baseball or a smiley face. The participants had three minutes for this task. After that the teaching assistant discussed the solutions with the team members and emphasized that even small variations lead to new solutions. According to Kelley and Kelley (2013) highlights this exercise "the balance between fluency (the speed and quantity of ideas) and flexibility (how different or divergent they are)". The teaching assistant transitioned to the meeting's task and again emphasized the value of generating several different solutions to a problem. Sometimes even small differences can increase the usability of an application or spur new thoughts about the characteristics of the application's core feature.

In this meeting the team members should first engage in individual sketching and prototyping activities and then share multiple of their solutions with each other. The rationale for this procedure is that sharing ideas in a group should increase the chance that individuals come across ideas they would not have though of when working alone (Paulus, 2000, p. 245f). This in turn can enhance the number of ideas generated by an individual (Paulus & Yang, 2000, p. 84). Overall, research findings suggest that sharing multiple individually created designs leads to more individual exploration of alternative solutions (Dow et al., 2011, p. 2812) and a higher quality of the final outcome (Dow et al., 2011, p. 2811).

Task 5 – Prototyping: Four different kinds of solutions

In the final meeting, the teams were asked to collaboratively create four low-fidelity prototypes of their mobile application. A whiteboard was used as shared drawing area. It was divided into four areas. Each prototype should represent a different kind of solution: (1) feasible, (2) desirable, (3) boring, and (4) playful. First, the feasible prototype should represent the features of the mobile application, which the team members belief they can implement as a functional prototype with their current skills and knowledge. Second, the desirable prototype should represent the features of the mobile application that are most beneficial from a user's perspective. For this prototype it was only relevant what the user might want. It did not matter whether the team could implement those features or not. Third, the boring prototype should represent the most dull and uninteresting version of the features of the mobile application. Fourth, the playful prototype should represent the most enjoyable and amusing version of the features of the mobile application. Again, each team had 45 minutes for the completion of this task.

The four different kinds of prototypes should provide the teams with different perspectives on their proposed solution and elicit new ideas. The boring solution functioned mainly as a blacklist, i.e., a list of solutions that should be avoided because they add no value or are cumbersome to use. The playful solutions gave the teams the possibility to imagine solutions that are engaging and fun to use. In addition, the characterization of the solution as playful should facilitate the team members in the generation of unusual ideas.

The different perspectives should also highlight important discrepancies between the features they can easily implement (feasible solution) and those a user might actually value (desirable solution). For the creation of a profitable mobile service, it is more important to think about the features that provide a value for the user than those that are easy to realize. If the team can do it right away, others might too. However, creative features that benefit the user but exceed the team's capabilities inhibit also a high level of uncertainty and thus are prone to rejection (Mueller et al., 2012, p. 16). The creation of prototypes for both perspectives should enable the teams to identify an overlap between what they can do and what a user might want. In addition, the desirable solution indicates opportunities for the team to thrive through the acquisition of additional knowledge and skills. Moreover, if the desirable solution seems to be impossible it might incite exploratory learning (Sitkin, See, Miller, Lawless, & Carton, 2011, p. 545) that possibly enables the development of an original and valuable product.

5.5 Description of the Collected Data

This section describes the collected data. With respect to data collection we followed Bhattacherjee's (2012, p. 43) advice "[…] to collect as much and as diverse data as possible […]" (Bhattacherjee, 2012, p. 43) in order to provide various possibilities for the generation of new insights during data analysis.

We collected data using four techniques: (1) audio and video recording, (2) written and electronic field notes, (3) questionnaires, and (4) archival data. For our analysis, we relied on

the video[11] data as the main source of data. Video data provides advantages over other forms of date for the study of complex interactions between individuals (see also chapter 5.1.3). The additional data served as important sources for triangulation and provided supplementary sources for understanding events and activities. The field notes provide a means for gaining additional perspectives on key issues. The questionnaires enabled the collection of demographic data, personal characteristics of the individual team members as well as additional information on the participants' perception of the team meetings. The archival data provided the necessary information about the inclusion of individual features in the teams' solutions as well as the teams' description of the project.

The section is structured as follows. First, we describe how we recorded the audio and video data, which was the main source of data for the in-depth analysis conducted in this study. Second, we describe the questionnaires to query the participants' characteristics in terms of demographic and personal attributes. Third, we describe the questionnaires to query the perception of the participants concerning the examined team meetings. Finally, we describe the additional data, which was available for the investigation in this study.

5.5.1 Description of the Audio and Video Recording

First it has to be noted that the participation in this research study was optional and by no means a requirement of the university course. We explained the intended study to the students, guaranteed them absolute confidentiality of the collected data and explained their right to view the videotapes and/or request its erasure and that they can refuse to participate or withdraw from the study at any time, without any penalty or prejudice. We also informed the students that results from this study will be published in summarized form (see appendix A). All participants declared their written consent to participate in this study.

For all three teams, we collected audio and video recordings of five team meetings. For a description of the meeting tasks see chapter 5.4.5.4. We recorded the meeting itself as well as the team's subsequent discussion of the meeting result with members of the teaching team. The meetings were conducted in the Automotive Service Lab. This is a former seminar room at TUM that is equipped with a whiteboard (with an approximate size of 120 to 160 cm) and two pin boards, a central meeting table for up to 8 people and a U-shaped table constellation with five 27" Apple iMac computers on top of them.

We tried to make the data collection as unobtrusive as possible by using common everyday devices. For the audio recording, we used a Smartphone (Apple iPhone 3GS with the mobile application 'voice memos') that was lying either on the meeting table or on the table next to the whiteboard depending on the planned content and working area of the meeting. In addition, we used the audio and video recording function of two of the five iMacs in the room. The iMacs are equipped with high definition webcams and built-in microphones. We used the software program iMovie for the audio and video recording. The computer screens were turned off so that the two iMacs that were used for recording were almost

[11] We use the term video (as in video data) to mean both audio and video capability.

indistinguishable from the other three iMacs next to them. Only a small green light-emitting diode, which was located next to the iMac's webcam, indicated the activated video recording.

5.5.2 Questionnaires Regarding the Characteristics of the Participants

This section describes the data that was collected via questionnaires. For each collected item we provide the rationale why we collected it, describe the chosen measuring instrument and explain our selection.

We collected data about the participants' demographics and personality traits. Research on groups and teams suggests that diversity affects group processes, task performance and creativity (e.g. Ancona & Caldwell, 1992; Harrison et al., 1998; Mannix & Neale, 2005). Similarly, research on groups found relationships between a group's compositions of personality traits and its processes and outcomes (e.g. Barry & Stewart, 1997; Chirumbolo, Livi, Mannetti, Pierro, & Kruglanski, 2004; Schilpzand et al., 2011). In addition, research on creativity suggests that personality traits are related to people's creative performance (e.g. McCrae, 1987).

Our motivation for the collection of theses data was not to prove or contradict existing theories on how team composition based on demographics, skills or personality traits affects team creativity. The number of team studied in this research is too small to give us conclusive results about those effects. We collected the data to be able to include alternative explanations for our findings based on existing input-output theories.

5.5.2.1 Demographic Characteristics and Skills

Research findings in the fields of creativity and team suggest that team composition plays a critical role with regard to a team's creative performance (Reiter-Palmon et al., 2012, p. 297). In addition, team members' skills and experiences might affect their behavior and decisions during the project. We collected data about the participants' gender, age, nationality, education level, course of study as well as their programing and language skills. Below, we provide our motivation for the collection of those data.

Gender

Research findings suggest that surface-level diversity (also called demographic diversity or background diversity), including gender, age and ethic diversity, affects team performance and creativity (Harrison et al., 1998, p. 97; Reiter-Palmon et al., 2012, p. 297). Findings from a meta-analysis by Hülsheger, Anderson and Salgado (2009, p. 1138) lends support for the hypothesis that surface-level diversity negatively affects team creativity and innovation. In addition, research shows that mixed-gender teams tend to have a slightly lower group performance (Mannix & Neale, 2005, p. 35) and are less creative (Choi, 2007, p. 226). Other research, however, suggests that gender differences positively affect the creativity of the outcome due to the "[…] qualitatively different life experiences […]" of men and women that adds variety to the team's perspectives on the task and ideas (Curşeu, 2010, p. 100). According to the findings of another study, the negative effects of diversity in terms of age and gender also might fade away over time (Baer et al., 2008, p. 267). In a study on student

team effectiveness gender diversity had no significant effect on the teams' outcome in terms of team performance and goal achievement (Deeter-Schmelz et al., 2002, p. 119f).

Our rationale for the consideration of gender differences within a team is that it might changes the behavior of team members towards each other. Some individuals might feel uncomfortable when working with someone of the opposite sex or they might compete against other team members of the same sex for the attention of a team member of the opposite sex. It might also be possible that in mixed gender teams, the team members occupy roles that do not reflect their competences but rather a traditional understanding of gender roles. A further effect could be that gender differences may make the female suggestions ignored.

Age

Age is another characteristic for surface-level diversity (Harrison et al., 1998, p. 97). Similar to the effects of gender variety, research on the effects of age variety in teams found that it could positively affect creativity (Choi, 2007, p. 226) or that the initial negative effect of gender and age differences on creativity might fade away over time (Baer et al., 2008, p. 267).

Our rationale for the consideration of age is that, for example, age differences may lead to one person being listened to more than others because of perceived additional experience. In addition, the distribution of roles in the team, and in particular that of the team leader, could be influences by the perceived level of a team member's seniority instead of his or her actual qualification for this role.

Nationality

Similar to gender and age, research generated mixed findings with respect to the effects of nationality diversity and team creativity (Reiter-Palmon et al., 2012, p. 297). For example, Curşeu (2010, p. 100) assumes that the variety in perspectives based on team members' different cultural background has a positive effect on team creativity. His study is supporting the assumption that variety (as a combined variable that is composed of gender, age and nationality diversity) enhances team creativity (Curşeu, 2010, p. 104). In addition, diversity in nationality is found to benefit information processing (Dahlin et al., 2005, p. 1107). Yet other research suggests that ethnic diversity impedes team performance and reduces communication among team members (Harrison et al., 2002, p. 1031).

Our rationale for the consideration of age is that nationality differences may lead to natural conflicts based on variety in perspectives. In addition, differences in nationality are also indicative of possible cultural differences. Different cultural backgrounds might lead to conflicts in the team because of the different perspectives, values and strategies of the team members.

Course of Study and Education Level

Hülsheger, Anderson and Salgado (2009, p. 1138) found in their meta-analysis support for the hypotheses that a functional diversity (i.e., a diversity that is related to the job or task) is

positively related to creativity and innovation. However, while functional diversity is found to enhance team creativity, it also directly hampers team performance (Ancona & Caldwell, 1992, p. 321). This might be because of a team's limited ability to use and integrate information from diverse functional backgrounds. For example, research suggest that teams benefit from educational diversity only up to a certain point (Dahlin et al., 2005, p. 1119). The generation of creative idea benefits from the combination of diverse information and building on the ideas of others (Paulus & Yang, 2000, p. 77). Yet, too high levels of educational diversity impede a team's ability to benefit from the broad range of available knowledge (Dahlin et al., 2005, p. 1119). With too little overlapping knowledge team members cannot combine the available information due to a lack of expertise in the relevant content area (Cohen & Levinthal, 1990, p. 134; Dahlin et al., 2005, p. 1119).

Our rationale for the consideration of the participants' course of study is that the selected course of study indicates the functional and educational diversity of the team members. In addition, we assume that participants may have selected a course of study that allows them more freedom and more creative thought. Accordingly, these types of individuals may come up with more creative ideas. Moreover, a high level of homogeneous expertise in a team may lead to agreement on tried and tested ideas and thus impede the team to come up with new and useful solutions.

English Language Skills

In project teams with diverse nationalities members might speak different primary languages. In order to enable communication between all members of the team they have to use a common language. In our case this was English. Students have to demonstrate at least good English language proficiency for their university entrance allowance at TUM. However, business fluency is not required and as for most of the students English in their secondary language there might be a considerable differences among English language skill among the participants. Insufficient language skills might inhibit understanding of ideas and this in turn could lead to the exclusion of creative ideas. In addition, if someone is not able to express his or her idea in a way that the other team members can understand it, then the idea might not be included in the team's design.

Programming Skills

We gathered information about the participants' programming skills because we observed in our study project teams that were asked to design an innovative mobile application and develop a prototype that demonstrates the most important functionalities of their proposed solution. Therefore, participants may reject a good idea if they belief it would be too hard to implement or if they simply do not know how to implement it.

5.5.2.2 Personal Attribute: Creativity

Individual creativity is a possible predictor of team creativity (Paulus et al., 2012, p. 329). Although other factors affect the overall creativity of a team, anecdotal evidence suggests that an individuals' creative confidence is an important predictor of individual creative behavior (Kelley & Kelley, 2012). In addition, if a team experiences a shared sense of creative

confidence, i.e., "[…] a shared understanding that the team is more creative than each team member individually […]" (Baer et al., 2008, p. 255), team creativity increases (Baer et al., 2008, p. 274). Therefore, a team with self reported high creativity might be expected to generate a more creative product irrespective of group dynamics. However, the number of teams studied is too small to give us conclusive results if we observe this happening.

For the measurement of the individuals' level of creativity, we applied a self-rating measure. Empirical research findings suggest that creative individuals are aware of their creative abilities (Barron & Harrington, 1981, p. 453). Batey (2007) developed the „Self-Rating of Creativity" (SR) instrument based on the evidence that creative individuals "[…] possess insight into or awareness of their own creativity […]" (Batey, 2007, p. 168). The SR is a short, valid and reliable instrument to assess creativity (Batey, 2007, p. 168). It has been found to significantly and positively correlate to other measures of creative potential (Batey, 2007, p. 173), including Gough's (1979) Creative Personality Scale and Runco's Ideational Behavior Scale (Runco, Plucker, & Lim, 2001). In addition, the instrument has already been successfully used in other studies on creativity (e.g. Furnham & Bachtiar, 2008).

The SR measures creativity on a 10-point scale. The creativity rating is one of 11 personal attributes, which are assessed with this instrument. Other attributes are, for example, intelligence, humor and altruism. Participants are asked to rate their perception of the 11 personal characteristics in comparison with other people. Lower scores indicate that the person considers themselves as less creative than others. Higher scores indicate that the person considers themselves as more creative than others (Batey, 2007, p. 170).

We used this scale as it provides a short way to measure how creative people consider themselves. In face of the possibility that participants overestimate or underestimate their personal attributes in self-assessment tests (cf. Kruger & Dunning, 1999), we decided to use a self-rating scale. Anecdotal evidence from the managers of IDEO – a leading design and innovative consultancy – suggests that being confident about one's own creative abilities facilitates innovation and the implementation of ideas (Kelley & Kelley, 2012).

5.5.2.3 Personal Attribute: Innovativeness

Personal innovativeness in the domain of information technology (PIIT) is defined as an individual's "[…] willingness to try out any new technology" (Agarwal & Karahanna, 2000, p. 677) and is conceptualized as a personality trait, i.e., a descriptor of an individual that is relatively stable across time and situations (Agarwal & Prasad, 1998, p. 206). A greater PIIT has been shown to positively influence an individual's cognitive absorption in the interaction with IT (Agarwal & Karahanna, 2000, p. 685). Cognitive absorption is defined as "[…] a state of deep involvement with software […]" (Agarwal & Karahanna, 2000, p. 673), in which people exhibit temporal dissociation, focused immersion, heightened enjoyment, control and curiosity (Agarwal & Karahanna, 2000, p. 673). Therefore, we belief that information about the participants' degree of personal innovativeness in the domain of information technology can help in explaining the behavior of individuals and teams in matters of the design and development of an innovative mobile application.

Agarwal and Prasad (1998) developed a self-rating measure for the assessment of an individual's PIIT. The instrument consists of four statements that describe archetypal behaviors in the context of IT-related innovativeness (Agarwal & Prasad, 1998, p. 209). Individuals are asked to indicate their level of agreement or disagreement to those statements on a 7-point scale with "strongly disagree" and "strongly agree" as the end points. One of the four items is negatively worded to lessen potential problems from acquiescence bias (Agarwal & Prasad, 1998, p. 210). The PIIT score is the average across all statements with 1 indicating a low degree of innovativeness and 7 indicating a high degree of innovativeness (Agarwal & Prasad, 1998, p. 210).

The PIIT instrument demonstrated a satisfactory reliability and validity (Agarwal & Prasad, 1998, p. 210f). Regarding the scale's internal consistency, Agarwal and Prasad (1998, p. 210) reported, for example, a value of 0.84 for Cronbach's (standardized) alpha and a total-to-item correlation between 0.59 and 0.79. The PIIT measure has been successfully utilized in several research studies (e.g. Agarwal & Karahanna, 2000; Magni, Taylor, & Venkatesh, 2010; Sun, 2012; Thatcher & Perrewe, 2002) that were published in major IS journals, including Management Information Systems Quarterly.

Our motivation for the use of the PIIT measure is based on the reasoning that personal innovativeness in the domain of IT might affect a team's design if people scoring high on this scale dominated a team. It is also likely that people with high personal innovativeness scores are more likely to know about new and interesting applications and therefore are likely to include some of these innovative ideas in there suggested design ideas. This in turn could make their group's products more creative. Again, with only three teams, we cannot draw general conclusions about this potential effect if we observe it.

5.5.2.4 Personal Attribute: Playfulness

Research indicates that playfulness is an important antecedent of innovative behavior (cf. Amabile, 1996b; Folkestad & Gonzalez, 2010; Lin, Lin, Chen, & Teng, 2010; March, 1982) where innovative behavior is an individual's deliberate introduction or implementation of new ideas, products, processes or procedures in organizations (Yuan & Woodman, 2010, p. 324). Playfulness is a mind-set (Lieberman, 1977, p. 108) that is characterized by qualities such as freedom, spontaneity, imagination, flexibility, intrinsic motivation and creativity (Lieberman, 1977, p. 108; Serenko & Turel, 2007, p. 658; Shen, Chick, & Zinn, 2014, p. 64). The playful attitude and its respective behavior is irrespective of an activity's content or context and extends to all situations of life (Guitard, Ferland, & Dutil, 2005, p. 9; Mainemelis & Ronson, 2006, p. 86).

Research findings suggest that playfulness facilitates many aspects that are beneficial in matters of creativity and innovation. Playful people have an ability to reframe a situation in a way that makes it more entertaining and funny for themselves and potentially others (Barnett, 2007, p. 955). The related positive affect makes situations more enjoyable and pleasurable plus it stimulates people's intrinsic motivation (Isen & Reeve, 2005, p. 297; Shen et al., 2014, p. 64), which is also beneficial to creativity (Amabile, 1998, p. 79). Besides making situations more pleasurable and intrinsically motivating, playfulness can also help to overcome rigidity and functional fixedness (Coon & Mitterer, 2013, p. 327) by applying, temporarily, an

alternative set of rules that dismisses the rational imperatives of business life toward consistency (March, 1982, p. 77). Therefore, with the utilization of the "[…] combinatorial freedom of play […]" (Miller, 1973, p. 96), playful behavior may results in a higher adaptability to novel situations because it allows experimentation with possibly useless or unproductive activities (Miller, 1973, p. 96). Engaging in exploratory behavior through playful task interaction is in turn considered to promote the development and exercise of skills and enhance learning (Glynn & Webster, 1992, p. 92; Martocchio & Webster, 1992, p. 557; Miller, 1973, p. 95). In addition, playfulness facilitates individuals in being open to experiences, which is associated to creativity and divergent thinking (McCrae, 1987, p. 1263). This is reflected, for example, in the findings of Guitard, Ferland and Dutil's qualitative study (2005): playfulness enables individuals to "[…] distance themselves from others, from situations and from conventions in order to approach situations with an open mind to find original solutions to problems, to confront difficulties and to accept failure" (Guitard et al., 2005, p. 9).

Lieberman's pioneering work on playfulness (1965, 1966, 1967, 1971, 1976, 1977) laid the foundation for the study of playfulness as an individual characteristic. With her seminal research on the relationship between playfulness and the use of computer in the workplace Webster (1988, 1989) introduced playfulness as a personality trait to information systems research.

In response to the lack of a measure of adults' playfulness in the workplace Glynn and Webster (1992) developed the Adult Playfulness Scale (APS). The APS is a questionnaire that utilizes a 7-point semantic differential scale and consists of 32 adjective pairs with more or less opposite meaning. An exploratory factor analysis by Glynn and Webster (1992, pp. 92-97) resulted in 25 items that loaded on five factors: (1) spontaneous, (2) expressive, (3) fun, (4) creative, and (5) silly. With Cronbach's coefficients alpha between .73 and .83 for the subscales of the five factors, the scale can be considered as reliable (Glynn & Webster, 1992, p. 92). The convergent and predictive validity reported by Glynn and Webster (1992, p. 93) is also supported in other studies (e.g. Amabile, Hill, Hennessey, & Tighe, 1994; Bozionelos & Bozionelos, 1999; Glynn & Webster, 1993; Proyer, 2012a).

According to Glynn and Webster (1992, p. 93) correspond the five factors of adult playfulness to Lieberman's (1977, p. 25) factor structure for playfulness of children and adolescents, which is measured by Lieberman's Playfulness Scale (PS). Two factors of the APS (i.e., spontaneity and creativity) correspond to three of the five factors (i.e., cognitive spontaneity, physical spontaneity, social spontaneity) of the PS, the factor expressive of the APS corresponds to manifest joy of the PS, and the two factors fun and silly of the APS correspond to sense of humor of the PS (Glynn & Webster, 1992, p. 93).

We are aware of the criticism regarding this measure (cf. Barnett, 2007; Kruger, 1995; Schaefer & Greenberg, 1997). However, other measuring instruments have their own issues (Shen et al., 2014, pp. 66-68). Moreover, the APS was specifically designed to measure adult playfulness in the workplace, which is the area of application to which we focus our research.

Currently, Proyer (2014, pp. 97-102) is developing a new self-report measure for adult playfulness with initially results that look very promising. Playfulness in adults is

conceptualized as a four-dimensional concept: (1) other-directed, (2) lighthearted, (3) intellectual, and (4) whimsical (Proyer, 2014, p. 99). The findings from the initial assessment of this measure are encouraging (Proyer, 2014, pp. 100-102) and thus we will consider its use in further studies. At the time when we conducted our study, the OLIW (Other-directed, Lighthearted, Intellectual, Whimsical) instrument was not yet available and even the concept reported in Proyer's habilitation treatise (2014) needs further research for the substantiation of its usefulness and predictive power.

In our study, we used for the evaluation of the personal attribute of playfulness Glynn and Webster's (1992) Adult Playfulness Scale. Participants were asked to describe themselves by selecting for each of the 32 polar adjective pairs the adjective they feel is more descriptive of them. The playfulness score is calculated by adding together the values of the 25 items, which loaded on the five factors relevant to playfulness. As all but two items are reverse scored, higher scores indicate greater playfulness (Glynn & Webster, 1992, p. 91).

We used this survey because we reasoned from existing literature that it would be likely that team members who scored high on playfulness would be more likely to generate creative ideas which would also have an impact on the final creative product of the team. For example, a team with a large number of members who scored high on the playfulness scale might have a greater advantage of turning out a creative product and also might be less likely to engage in various forms of group dynamics that would hinder product creativity. This would be an interesting result if we observed this, but again the number of teams we are studying would be too small to make this result conclusive.

5.5.3 Questionnaires Regarding the Participants' Perception of the Team Meetings

This section describes the data that was collected via questionnaires directly after each of the videotaped team meetings. The main purpose of these questionnaires was the assessment of the team members' individual perception of the meeting. In the following we describe the scales that we used and provide a rationale for why we used them.

5.5.3.1 Intensity of Flow Scale

We used Webster's (1989, pp. 88, 189) Intensity of Flow Scale to assess the participants' immediate subjective experience during the meeting. This scale is based on Csikszentmihalyi's (1975) flow theory and measures people's cognitive absorption and how involved they were in performing an activity. According to Cskiszentmihalyi (1975) flow is characterized as a state of optimal experience in which people "[…] act with total involvement […]" (Csikszentmihalyi, 1975, p. 36). Being in the state of flow occurs in conditions of high challenges and skills (Csikszentmihalyi & LeFevre, 1989, p. 815).

Research on human-computer interaction suggests a conceptualization of flow in terms of three dimensions: (1) control, i.e., the experience of a feeling in control over the activity; (2) attention focus, i.e., a narrowed focus and absorption in the activity; and (3) cognitive enjoyment, i.e., curiosity in term of a heighten responsiveness to novel stimuli and a desire to attain competence in executing the activity as well as intrinsic interest in terms of feeling enjoyment and pleasure through the execution of the activity (Agarwal & Karahanna, 2000, p.

668; Webster, Trevino, & Ryan, 1993, pp. 413f, 420). The conceptualization of flow as a multidimensional construct is based on Cskiszentmihalyi's (1975, pp. 72, 78-87) characterization of the flow experience. According to Webster, Trevino and Ryan (1993, pp. 417, 420) these dimensions are interrelated.

Webster (1989, pp. 88, 189) developend the 11-item self-rating Intensity of Flow Scale in order to measure the degree of flow in computer interactions. This scale is based on an interview checklist created by Csikszentmihalyi (1975, p. 113). Webster (1989, p. 114) applied the scale in an experiment and reported an acceptable reliability scores with a Cronbach's alpha of .74. Further, the scale shows concurrent validity as it correlates significantly with measures, including involvement and positive affect, which are indicative of cognitive absorption in an activity (Webster, 1989, p. 114).

Other possible scales to measure the participants' flow state would have been Trevino and Webster's (1992, p. 553f) four-item scale or Webster, Trevino and Ryan's (1993, pp. 415f, 424f) 12-item scale, which is an advancement of the aforementioned scale. Both are self-report flow questionnaires. Although Webster, Trevino and Ryan's (1993, pp. 415f, 424f) measure is usually used to measure the flow state in computer interactions (Woszczynski, Roth, & Segars, 2002, p. 371) we decided to use Webster's (1989, pp. 88, 189) Intensity of Flow Scale because this scale is less specific to interactions with a computer system. The focus of the meetings was the work on specific tasks and we were more interested in the participants' task-related subjective experience rather than in their assessment of the situation based on the tools, which they had applied.

We measured the participants' perceived intensity of flow because we were interested in their level of cognitive absorption in the activity and their perceived relationship of the task's challenge and their skills. Further, we would assume that participants might react dismissive to suggestions that would disturb their state of being in flow. That is, a team member that is totally involved in an activity (e.g., the design of a mockup for an idea) and feels enjoyment and pleasure in this activity might ignore other team members' suggestions and thereby unintentionally exclude ideas from being integrated in the team's proposed solution.

As flow is a temporarily limited state (Woszczynski et al., 2002, p. 374) it is best measured during or within a short temporal proximity after the work on a task (Webster et al., 1993, p. 420). Therefore, all team members were asked to complete the Intensity of Flow Scale directly after the meeting. It has to be noted, however, that the teams discussed their solution with the teaching team right after they completed the meeting task. Only after this the participants completed the questionnaires for the assessment of their perception of the work on the meeting task.

5.5.3.2 Adapted Version of the Computer Playfulness Scale

An adapted version of Webster and Martocchio's (1992) Computer Playfulness Scale (CPS) was used to measures the team members' cognitive playfulness. Based on Novak, Hoffman, and Yiu-Fai (2000, p. 29) and Agarwal and Prasad (1998, p. 210) and consistent with Webster and Martocchio (1992, p. 210f), we modified the instruction and the scale items to make it situation-specific to the meeting. For example, one of the seven items read: I felt playful when

executing the task. Therefore, the adapted CPS was used to assess the degree to which individuals perceived themselves as cognitive playful during the meeting. Researcher argue that a high level of cognitive playfulness has a positive effect on invention and imagination (Martocchio & Webster, 1992, p. 563). In addition, playful behavior is associated with flexibility and adaptability to new situations (Miller, 1973, p. 96).

Webster and Martocchio (1992) conceptualized computer playfulness as a situation-specific trait that represents the level of cognitive spontaneity in the interaction with a computer (Webster & Martocchio, 1992, p. 203f) and developed the CPS to measure it (Webster & Martocchio, 1992, p. 212). The CPS is based upon the cognitive spontaneity construct of Lieberman's (1977, pp. 153-156) playfulness scale. It is a 7-item self-rating scale. Participants indicate their level of agreement for each item on a 7-point Likert-type scale that ranges from strongly disagree to strongly agree (Martocchio & Webster, 1992, p. 563; Webster & Martocchio, 1992, p. 212). Webster and Martocchio (1992, pp. 211-216) report internal consistency reliability ranging from .86 to .90 across five studies, concurrent validity, discriminant validity (e.g., no relationship between CPS and gender or age), predictive validity, predictive efficacy, and test-retest reliability (correlation of .85 ($p < .001$)). Utilizations of the CPS in other studies (e.g. Agarwal & Prasad, 1998; Novak et al., 2000; Yager, Kappelman, Maples, & Prybutok, 1997) provide additional support for its reliability and validity.

Initially the CPS was considered as a unidimensional measure. A more recent investigation of the CPS, however, found severe issues with its applicability as a unidimensional measure. Serenko and Turel (Serenko & Turel, 2007) investigated the unidimensionality of the CPS because several studies reported low and inconsistent item loadings for the CPS. Based on their investigation, they concluded "that the original computer playfulness construct consists of two correlated but distinct factors when administered to today's IS users" (Serenko & Turel, 2007, p. 657). The first factor is still labeled computer playfulness. Items that loaded on this factor (i.e., spontaneous, flexible, creative, and playful) show a strong relation to the initial definition of playfulness. They labeled the second factor interactive resourcefulness. Items that loaded on this factor (i.e., imaginative, original, and inventive) can be associated with the way people use their imagination, originality and inventiveness for problem-solving tasks (Serenko & Turel, 2007, p. 663). Serenko and Turel's (2007, p. 663) distinction into the two factors playfulness and resourcefulness provides an additional value for the interpretation of individuals perception of the meetings.

We measured the participants' perceived cognitive spontaneity by using the adapted version of the CPS for similar reasons as we measured their perceived intensity of flow. This measurement focuses primarily on self-reports of participants' behavior during the meeting (Woszczynski et al., 2002, p. 371). The questionnaire asked participants about their subjective feelings during the execution of the task. Consequently, this measure provides indications of the participants feeling regarding his or her spontaneity, inventiveness and imagination during the meeting (Webster & Martocchio, 1992, p. 204). This might provide additional information about possible reasons for idea inclusion or exclusion. For example, a team member who feels very creative and imaginative during a meeting might see valuable connections between otherwise unrelated ideas and thus supports the inclusion of an idea. Other team members, who feel more uninventive or unoriginal, might be in favor of the exclusion of this idea. It has

to be noted, however, that the data that is provided by this questionnaire is not intended to quantitatively explain reasons for idea inclusion or exclusion. The data will be used qualitatively for the interpretation of the group dynamics that lead to idea inclusion or exclusion. In doing so it represents an additional data source for the participants' perception of certain tasks.

5.5.3.3 Open Question: Describe One Moment

In addition, we added three open-ended questions to the questionnaire for the meetings three to five. The question asked participants to briefly describe a moment that they perceived as (1) very productive, (2) very funny, or (3) as a waste of time. Answering these questions was optional. We included theses questions, because we wanted to get supplementary information about the participants' perception of certain tasks and activities.

The first question asked participants about situations, which they perceived as productive. The feeling of being productive can be associated with positive emotions and a sense of achievement. However, not all team members may perceive an activity as being productive. Differences in the answers across the team could indicate potential conflict or the pursuit of different goals.

The second question asked participants about situations, which they perceived as funny. Working on a task with time constraints may lead to feelings of tension and stress. Both could have negative effects on creativity. Although time pressure could in certain situations spur creativity (Amabile, Hadley, & Kramer, 2002, p. 56) it might also evoke a need for closure and thereby cause the exclusion of new ideas (Chirumbolo et al., 2004, pp. 266, 275). Humor and fun can be used to relieve people's tension and reduce stress (Magnuson & Barnett, 2013, p. 136f). Fun is one facet of playfulness, which is among other things associated with imagination and creativity, and thus might foster the generation of new ideas (Proyer & Ruch, 2011, p. 4). In addition, takting a situation not too serious may also reduce people's reluctance to discuss absurd ideas. Therefore, moments that people perceived as funny might reveal activities that facilitated the inclusion of new ideas.

The third question asked participants about situations, which they perceived as a waste of time. These moments are perceived as unproductive and therefore may evoke negative feelings and dismissive attitudes. As an approximate opposite to the first question we wanted to gain additional information about activities that may cause a conflict in the team.

5.5.4 Description of Additionally Available Data

5.5.4.1 Results of the Meeting Tasks

The results of the meetings were photographed and, if possible, also attributed to the person who created it. Overall, we collected 37 documents for the three teams over the course of five meetings. The meeting results are used to assess whether or not ideas mentioned during the meeting have been integrated in the meeting's outcome.

5.5.4.2 Project Journal

The project journal was one of the required deliverables of the university course. It documents the team's course of action and the unobserved meetings of the team. In additions, it describes the team's results for the seven assignments and the meeting task. Moreover, it provides the team's rationale for their decisions and their lessons learned for the different tasks.

The content of the project journal (i.e., management summary, course of action, meeting minutes, rationale for decisions and lessons learned) was required and part of the grading. However, the student teams had complete freedom with regard to the structure and content of the project journal. That is, the teaching team did neither enforce the completion of a special template nor did they enforce the inclusion of all required parts of the project journal but rather graded the project journal according to criteria such as completeness, consistency and comprehensibility. Therefore, some teams may not describe all relevant parts of the project in the researcher's desired level of detail. Nonetheless, the project journals provide a valuable supplementary source of data, which describes activities and meetings, which could not be directly observed. In addition, the quality of the project journal and the included content offers valuable clues on the teams motivation and conscientiousness.

5.5.4.3 Questionnaires for the Evaluation of the Idea and the Presentation

The project team's proposed solutions were evaluated at several points during the project. Therefore, a varying number of raters assessed the teams' solutions based on the interim, pre-final and final presentation. The questionnaire for the assessment of the ideas has been slightly modified over the course of the three presentations. Even though the items of the three questionnaires are not identical they provide comparable results for a qualitative analysis of the evaluations.

In each case, raters assessed the teams' presentations as well as the presented idea on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). The questionnaires, which were used in the pre-final and the final presentation, included two additional questions that asked the raters about the business value and their purchase intent (Girotra et al., 2010, p. 597f). For these questions, a 10-point scale was used with 1 indicates a low and 10 a high expected business value and purchase intent respectively. The questionnaire for the final presentation included an additional page that the jury could use to compare the three teams for their collaborative decision on the winning team.

The evaluation of the teams' proposed solutions provide an indication for the creativity of their outcome. In addition, it shows how the ideas were perceived among peers (only interim and pre-final presentation) and experts (all three presentations). Moreover, the assessment of the final presentation provided a brief rational for the selection of the best project.

5.6 Data Analysis

This section describes our approach and the respective course of action for analyzing the data. In general, we followed the constructivist grounded theory approach according to Charmaz (2006, 2014). Section 2.1 provides a comprehensive description of this approach. For the

analysis of the data we used a combination of grounded theory methods (cf. Charmaz, 2006, 2014) and methods from interaction analysis (cf. Jordan & Henderson, 1995; Ruhleder & Jordan, 1997; Suchman & Trigg, 1991; Tang & Leifer, 1991). Rather than describing how theses methods should be used, we describe in this chapter how we have proceeded in our exploration of processes and factors that are related to idea inclusion during creative work in team meetings.

The remainder of this section is structured as follows: At first, we explain our steps for the preparation of the data analysis in conjunction with the initial analysis of the data. Afterwards, we describe the main steps of coding and theorizing to build theory.

5.6.1 Preparation, Initial Analysis and Tools Used

In the subsequent paragraphs we provide a brief overall account of the preparation activities and our initial approach to data analysis. Afterwards, we describe in section 5.6.1.1 our initial steps in the analysis of the team meetings. Finally, we describe in section 5.6.1.2 the tools, which we used for the analysis of the team meetings.

In accordance with the suggested procedure for grounded theory studies, we began our analysis already during data collection (Charmaz, 2014, p. 15). At the beginning of the observed projects, we limited our data analysis to the artifacts (e.g., presentations of ideas and preliminary solutions) created by the study's subjects (i.e., teams), the data collected via the questionnaires and our field notes from observations and interactions with the teams and individual team members. The initial analysis was rather rough. It was intended to iteratively learn more about the subjects and their situation. After recording the team meetings, we began with the screening of the videos and carried out the first steps (i.e., the creation of rough content logs) for the interaction analysis (cf. Jordan & Henderson, 1995, p. 43).

Already at this stage, we began to write memos (cf. Charmaz, 2014, p. 162). At this stage, the memos were handwritten notes about initial interpretations of directly observed events. For example, we noted that team A2B's proposed solution did not change much over the course of the first three meetings. At its core their result for the third meeting resembled mainly the team's initially proposed solution, which was presented in the 2nd idea presentation. This was surprising because the team has received a distinct feedback from the corporate partner as well as from the teaching team in relation to necessary advancements of their proposed solution. From an outsider's perspective, the team seemed to collectively pursue a shared goal that was deviant to suggestions from experts and mentors. Therefore, we described the team in one of our memos as being resistant to feedback and obstructing. Only by our analysis of the team meetings we realized that the team members did not share a common opinion regarding their final product.

Given the dual role as researcher and teaching assistant it was not possible to engage in a detailed analysis of the video data during the duration of the projects. After we had recorded the weekly meeting for all three teams we skimmed through the videos (1) to assure that the

meeting was properly recorded[12] and (2) to familiarize ourselves with the data (cf. Tang & Leifer, 1991, p. 211). Thereby, we gained already a rudimentary understanding of the dynamics in the teams. In addition, we used these understandings to make small changes to the design of the next meeting. In this respect, we would, however, not speak of some kind of theoretical sampling (cf. Charmaz, 2014, p. 192). The majority of the adaptations of the meeting designs occurred in consultation with the lecturer for reasons concerning the improvement of the teaching in this university course. Further steps with respect to the detailed analysis of the video data (e.g., the transcription of the videos) were only taken after the end of the projects, which was at the same time also the end of the university course, and thus, the end of the role as teaching assistant, too.

5.6.1.1 Initial Steps in the Analysis of the Meeting's Video Recordings

Content Descriptions

For the preparation of the analysis of the videos, we followed the advices of Jordan and Henderson (1995, p. 43) for conducting interaction analysis and started with the creation of content logs. We created the content logs directly after the video recording of each task. This enabled us to add specific comments and explications of events, which we might otherwise have forgotten (cf. Jordan & Henderson, 1995, p. 43). Furthermore, we skimmed through the videos for a first time in order to assess their quality and to get a first impression on the meetings' content and course of events. We also reduced the quality of the videos to reduce the necessary disk space and make them easier to use with qualitative data analysis software.

In addition to the content logs, we created rough content listings (cf. Jordan & Henderson, 1995, p. 43). According to Suchman and Trigg (1991, p. 77), a content listing[13] is a useful tool during interaction analysis as it helps to retrieve certain instances later on during the analysis of the video data. A content listing describes events in a chronological order along with a time stamp (Jordan & Henderson, 1995, p. 43; Suchman & Trigg, 1991, p. 77). We screened the available video footage and classified it into large sections. We assigned each section a meaningful headline and a short description of the events. In accordance with Jordan and Henderson (1995, p. 43) we made no attempt to achieve consistency in the coverage of our content listings. The intention of the content listing was merely to provide a rough outline of the video's content.

[12] Thereby, we noticed, for example, that one of two recordings of team A2B's last meeting failed due to technical issues with the recording device. This enabled us to take countermeasures in order to properly record the meetings of the other teams, which were held shortly afterwards.

[13] We use the terms content log and content listing in accordance with Jordan and Henderson (1995, p. 43). However, Suchman and Trigg (1991, p. 77) refer to the content listing with the term content log. In order prevent misunderstandings we use the terms consistently as they are suggested by Jordan and Henderson.

Screening of the Videos

In the next step, we attempted to gain a deeper understanding of the interactions and dynamics during the meetings. That is, interactions among the members of the team and between the team members and the external representations of their ideas in addition to further observable reactions triggered by these interactions. Therefore, we structured the video into small, self-contained units of group interaction. This allows us to interpret the interactions in their context (Franco & Rouwette, 2011, p. 171). As we are interested in events of idea inclusion and exclusion, we structured the videos accordingly. That is, we created clips (see Woods & Dempster, 2011, p. 12) of instances, in which ideas were proposed. It has to be noted that the creation of the clips was not a one-time activity but an iterative process, which was carried out relating to the coding of the data. Later on, the creation of clips was replaced by the creation of tables in a spreadsheet program, which we also used for our data analysis.

Transcription and Description

Even though transcribing the videos was part of the analytic process for much of this research, we describe it at this point since we started with it as part of our preparatory activities.

According to Kowal and O'Connel (2014) the "[..] generic term *transcription* [..] refers to any graphic representation of selective aspects of […] vocal behaviour" (Kowal & O'Connell, 2014, p. 66 italics in the original). That is, in its most basic sense, a transcript is a written text that gives an account of spoken words (Kowal & O'Connell, 2014, pp. 64, 66f). Yet, it has to be distinguished between a transcription and a description. As mentioned before, a transcription is the representation of spoken words in a written form. A description, on the other hand, is used to supplement the transcribed words in order to denote non-verbal behaviors (Kowal & O'Connell, 2014, p. 66). At this point we refer the interested reader to Kowal and O'Connel (2014) for a thorough description of the role, importance and challenges with respect to transcriptions.

Over the course of this research, we created descriptions as well as transcriptions of the video data at various levels of detail. We started with the creation of descriptions of the observed interactions and communications. Therefore, we used afore mentioned content listings as a starting point. In accordance with Jordan and Henderson (1995, p. 43) as well as Suchman and Trigg (1991, p. 77) we created full transcripts only for particularly interesting sequences. For the transcription of verbal behaviors, we applied Jefferson's (2004) transcription notation for conversation analysis (see appendix B) as guidelines (e.g., [square brackets] to indicate the start and end points of overlapping speech). However, we did not use the full range of possible notation in our transcription (e.g., ↑ to indicate a rising pitch or intonation). In addition, we did not always indicate verbal behaviors in our transcripts but only if we saw a benefit in their application. We supplemented our transcripts by descriptions of contextual information and descriptions of interactions if we deemed it relevant for the understanding of an interaction or situation. These descriptions were put into curly brackets.

However, as basically all transcripts are only selective representations of reality it is advisable to verify the interpretation of a transcript by checking back at the respective audio and video

recordings (Kowal & O'Connell, 2014, p. 66). Therefore, we relied for our interpretations mainly on the actual video data and used the descriptions and transcriptions to navigate within complex and otherwise not searchable data.

5.6.1.2 Tools Used in the Analysis of the Meetings' Video Recordings

The Qualitative Research Software Transana

For the description, transcription and analysis of the videos we used Transana, which is a computer program that has been specifically designed for the transcription and qualitative analysis of images, audio data and video data (Dempster & Woods, 2011, p. 2; Woods & Fassnacht, 2014). We used Transana in its standard version 2.61b for Mac OS X, which is a single user version with limited capabilities regarding the use of media files and transcripts. The standard version neither allows the parallel work on multiple media files nor the simultaneous work with multiple transcripts. That is, at any given time only a single media file and a single transcript can be analyzed (Woods & Fassnacht, 2014).

The main benefit of Transana, compared to other qualitative software like Atlas.ti, is, that it has been specifically designed for the work with media-based data. According to Woods (2014) this is necessary because working with videos is fundamentally different from working with text. For example, it is common that after the transcription of an interview is finished the audio file is disconnected from its textual representation and only the text is used for the subsequent analysis. Yet, keeping the connection between the underlying media file and the transcript has benefits with respect to both transcription and analysis of the data. For example, it provides the possibility to incrementally improve a transcript during the analysis of the data as well as the opportunity to exploit the underlying time line (Woods & Fassnacht, 2014).

In Transana, the raw data (e.g., video files) is organized as series of episodes with transcripts. A series is a directory that can contain further series, episodes and notes. The media file is referred to as an episode. Each episode needs to have at least one transcript[14] but can also have multiple transcripts (e.g., a verbatim transcript of the subjects' utterances and a descriptive transcript in form of a content listing). As transcripts and episodes are connected both can be used to navigate through the data. Transana supports the analytic process via the possibility to create clips (e.g., the video sequence of an incident of interest) and organize the clips in collections (e.g., incidents that belong to the same category of events). The process of coding is enabled by keywords that can be applied to individual media clips in collections. The analytic process can be reflected in notes (i.e., memos). Notes can be created to series, episodes and collections. With respect to theory building qualitative research provide clips the evidence of the emerging theory that is contained in collections and reports and reflected by the analytical notes (Woods & Fassnacht, 2014).

[14] With respect to Transana, the term transcript refers to the software functionality that provides the possibility to create written or graphical representations as well as descriptions, which can be synchronized with a video by the application of time stamps.

In our research, we used Transana for the creations of transcripts at various levels of detail as well as for the initial and focused coding (cf. Charmaz, 2014, p. 116ff). The possibility to work simultaneously with a transcript and the respective audio-visual data enabled us to start with the analysis and the coding of the data even without a full transcription of the videos. In addition, we could, whenever necessary, continuously improve our transcripts over the course of our analysis. We made use of keywords for the initial coding and partly also for the focused coding of the data. Collections were used to group similar incidents as well as to organize clips, in which a team member proposes an idea, according to the respective team and meeting.

Other Tools

As already mentioned above, we replaced the further creation of clips in Transana by the creation of tables in the spreadsheet program Microsoft Excel at a later stage of our data analysis. We used the tables to describe events, in which ideas were proposed. The description of the events was supplemented by metadata to easily locate the respective scene in the video data. We did this for three reasons. The created tables provided (1) a valuable overview of the data, (2) were more easily searchable and (3) the items could be easily sorted according to the requirements of the current analysis. In addition, it suited more the necessity in matter of the increasing abstraction from our data towards theoretical considerations but still enabled going back and forth between our data and the emerging theory.

Beside the use of the qualitative software package Transana and other digital tools, we used throughout our data analysis also pen and paper for taking notes as well as for sketching sequences of events and interactions. The use of these offline media seems almost outdated and has also certain disadvantages compared to digital tools, especially with respect to modifiability, reusability or searchability of the created content. Yet, research findings attest note taking on paper certain advantages compared to note taking on a laptop (cf. Mueller & Oppenheimer, 2014). In addition, we appreciated the flexible and intuitive usage of pen and paper to quickly and persistently express our thoughts.

5.6.2 The Three Major Steps from Data to Build Theory

We analyzed our data in a qualitative manner and an iterative fashion with the goal of generating hypotheses on the evolution of a team's solution to an assigned design problem. Our main data source were a video collection of five meetings of three teams, in which the teams worked on specific creative tasks that contributed parts (e.g., creating a user journey or designing a prototype for the mobile application) to solving an assigned design problem, which was in our case the development of a mobile service for business travelers. Using methods from grounded theory and interaction analysis, the inclusion or exclusion of each team member's suggestions was examined in relation to why this inclusion or exclusion occurred.

During the collection of the video data, we discussed our observations and interpretations with colleagues from our research group and the other members of the teaching team on an irregular basis. Theses discussions were limited to observations made during the lectures, the teams' presentations and the discussions with the teams after the videotaped meetings. The

subjects of the discussions were mainly regarding the content and style of the teams' presentations and the team members' reactions to feedback and questions from the audience. Theses early discussions, in addition to our notes, helped us later on to put the observed meetings properly into the context of the teams' projects. After the completion of the studied projects, we carried out our in-depth analysis of the data.

The data analysis was carried out in three main steps: (1) initial coding, (2) focused coding and (3) theorizing. It has to be mentioned, however, that the actual act of analyzing the data was a lot less linear and straightforward than the description of it might suggest. Over the course of our study, we went back and forth between the data, our constructed tentative theoretical arguments and, as part of the increasing abstraction of our interpretation of the data, also the literature, which sensitized us about themes that become apparent during our analysis.

In the following, we describe the three main steps of our analysis. The description is done in the style of Pratt et al. (2006, pp. 239-241) and Harrison and Rouse (Harrison & Rouse, 2015, pp. 381-385).

5.6.2.1 Initial Coding: Construction of 1st-Order Concepts

For initial coding, we started with a turn-by-turn coding of the videos, in which we coded each team member's utterance according to the speaker turn-taking in the team's conversation. Thereby, we followed Charmaz's (2006, pp. 50-53) suggestion of using a line-by-line coding for the initial coding phase and adapted it to the kind of data we analyzed. That is, instead of lines in an interview transcript we decided to use as unit of coding the turns taken by the team members in the collaborative interaction during the meeting. Soon, we broadened the scope of turns that were considered by including action turns in addition to speaker turns (cf. Jordan & Henderson, 1995, p. 66). This was relevant because the work on design tasks involves both talking and activities, including drawing and pointing (Schön, 1983, p. 80). Thereby, the verbal and non-verbal forms of expression are closely connected, occur in parallel to complement each other (Schön, 1983, p. 81) or one may even replace the other, e.g., a respondent may respond to a verbally expressed question by performing an action (Jordan & Henderson, 1995, p. 66).

For the initial coding of interviews the line-by-line coding approach seems to be a good trade-off between a very detailed word-by-word coding and a rather rough incident-by-incident coding. With regard to the available transcripts of the meetings' videotapes, however, an applied turn-by-turn coding (i.e., we used a change in the acting and/or speaking person instead of lines in the transcript) proved to be not suitable for answering our research questions.

Therefore, we switched to an incident-by-incident coding for the following reasons. First, interviews are already focused on a specific topic and guided by the questions and interactions of the interviewer. In our case, the activities of the teams unfold freely during the videotaped meetings. Even though the meeting task determined the general activity as well as the expected kind of result (e.g., a low-fidelity prototype for a mobile application), the teams could decide at their own direction how they actually tackled the task. The incident-by-

incident coding enabled us to choose a more appropriate unit of analysis in order to provide a stronger focus on relevant actions with respect to our research question. Second, we analyzed audio-visual recordings of meetings, which is a very rich kind of data because it contains information including verbal utterances as well as nonverbal behaviors and activities. Thereby we realized that coding a unit of data as small as a single word, a line of a video's transcript or, as we tried at first, a single utterance or action could cause discern between the observed event and its context, and thus, might render it meaningless. To prevent this, we applied codes to incidents. An incident can still be an event as short as a team member's utterance or action. However, this change in the unit of analyzes enabled us to code also sequences of related interactions, For example, a discussion between several people about a topic such as the creation of an artifact in form of a written text or a drawn sketch.

For the initial coding, we watched a video, looked for instances, in which an idea was proposed and coded the respective instance. First, we went through the complete video recording of a meeting, took notes about events that we deemed relevant and familiarize us with the plot of the meeting. Second, we watched the video again. This time paying close attention to instances, in which a team member proposes an idea. We created a clip for the respective video sequence. Where relevant, we summarized the team members' interactions during the respective scenes, including the gist of the conversation and the observed actions. Afterwards, we coded the incident. Third, we transcribed sections of the interactions that were illustrative for particular kinds of interactions. Along the way, we wrote memos about codes, possible categories and the analysis process itself. We included in the memos also observations regarding the team's behavior and further information about the context of the meeting (e.g., what has happened before in the project) if it was applicable and relevant.

The results of this step were first-order concepts (see Figure 5 in the next section for an high-level overview of the first-order concepts and their mapping to our second-order themes). That is, the "facts" (Van Maanen, 1979, p. 540) that we have discovered in the course of our initial coding. In this context, the facts, however, are not objective representations of an indisputable truth but rather the product of our interpretations. Or, to say it with Miles and Huberman's (1994) words: "[…] facts are events to which we have given meaning" (Miles & Huberman, 1994, p. 145).

5.6.2.2 Focused Coding: Construction of 2nd-Order Themes and the Formulation of Hypotheses

After all of the relevant data has been initially coded and we have reached a strong analytical direction, we proceeded to the step of focused coding. The goal of this step was to sort out the bulk of existing initial codes in order to reduce it to only those codes that match the evolving direction.

At this stage, we actually decided to specifically study the dynamics in a team that lead to idea inclusion. We originally intended to identify contextual and behavioral factors that would explain what makes a team creative, i.e., what conditions facilitate the generation of creative ideas in team meetings. Yet, our inductive analysis led us in a different direction as the observed dynamics in the teams seemed to have a more profound effect on the team's outcome than the generation of creative ideas, for which we noticed that they were included

(or excluded) for various reasons but only at rare intervals because the team members believed they were especially creative. Such an adaptation of the direction is not too uncommon for studies applying grounded theory methods. The unprejudiced interpretation of data may disclose a previously unanticipated but promising and theoretically original direction. For example, Harrison and Rouse (2015) pursuit initially a more general study of the creative process. Over the course of their study, their attention was increasingly drawn to the observed feedback interaction during creative projects. They adapted their topic and investigated theses feedback interactions in more details, as it "[…] seemed theoretically novel in many ways" (Hargadon & Sutton, 1997, p. 380).

During the process of focused coding, we sorted through our initial codes in order to identify strong evolving directions, i.e., our second-order themes. For this purpose we compared instances with a similar code and similar consequences with respect to idea inclusion or exclusion to one another. Thereby, the construction of themes – which are also referred to as tentative conceptual categories (e.g. Thornberg & Charmaz, 2014, p. 159) – was not a straightforward process. Although some descriptions of this process in publication may suggest the reader that it is a well structured and orderly process, categories are more often than not created "[…] through an iterative, messy and ambiguity-laden process" (Locke, 2001, p. 50). We went back and forth between the data and our themes, pursued several promising directions according to the leads we found in the initial codes and throw occasionally everything overboard to start the focused coding afresh taking into account what we have learned.

Over the course of this coding phase, we developed four second-order themes (Figure 5). Originally, we identified eight themes (i.e., four for idea inclusion and four for idea exclusion) but realized then that the themes were fairly similar. The major difference lay in the team member's attempted consequence: facilitating the inclusion of an idea or preventing the inclusion of an idea. Yet, with the perception of an idea according to its basic meaning, i.e., as a thought, plan, or suggestion about what to do (see section 3.1), only the actor changes whereas the consequence remains similar in both cases. That is, from the idea originator's point of view, his or her pursued idea might concern a new feature for the mobile application. From the idea opponent's point of view, his or her pursued idea might concern the prevention of deviant changes with regard to the status quo of the team's proposed solution or the development of the proposed solution in a different direction. Consequently, both actors can be basically though of attempting the inclusion of their idea. Thus, we decided to focus our further analysis mainly on idea inclusion. Therefore, we finally ended up with four themes that occurred (from the point of view of the team member, who proposed the idea) in correlation to idea inclusion.

We observed these themes across all teams and across all meetings in relation to idea inclusion as a dominant consequence. According to this dominant consequence, we formulated for each of the themes a hypothesis (see Figure 6 in the next section for an overview of the hypotheses or Table 9 in section 6.1 for an brief description of them), which reflected our interpretation of the observed activities. Afterwards, we went back to the data and looked for confirming and disconfirming evidence. We describe this process and our respective findings in detail in chapter 6.

Figure 5 shows in addition to the 1st-order concepts and the respective 2nd-order themes also the kind of representation that is associated with the individual 2nd-order themes. The first three themes (i.e., repeated mentioning, support from teammates and high status person) are predominantly based on verbal behaviors (i.e., someone says something) whereas the last one (i.e., control of media) is predominantly based on physical behavior (i.e., someone does something). However, they can, but do not necessarily have to, be complemented by the respective other behavior, too. Accordingly, the first three themes are associated with mental representations of the idea – i.e., a mental image, which changes over time, with regard to how things fit together (Forrester, 1971, p. 112; Hill & Levenhagen, 1995, p. 1059) – whereas the last one is associated with external representations (e.g., a text or a sketch on a sheet of paper).

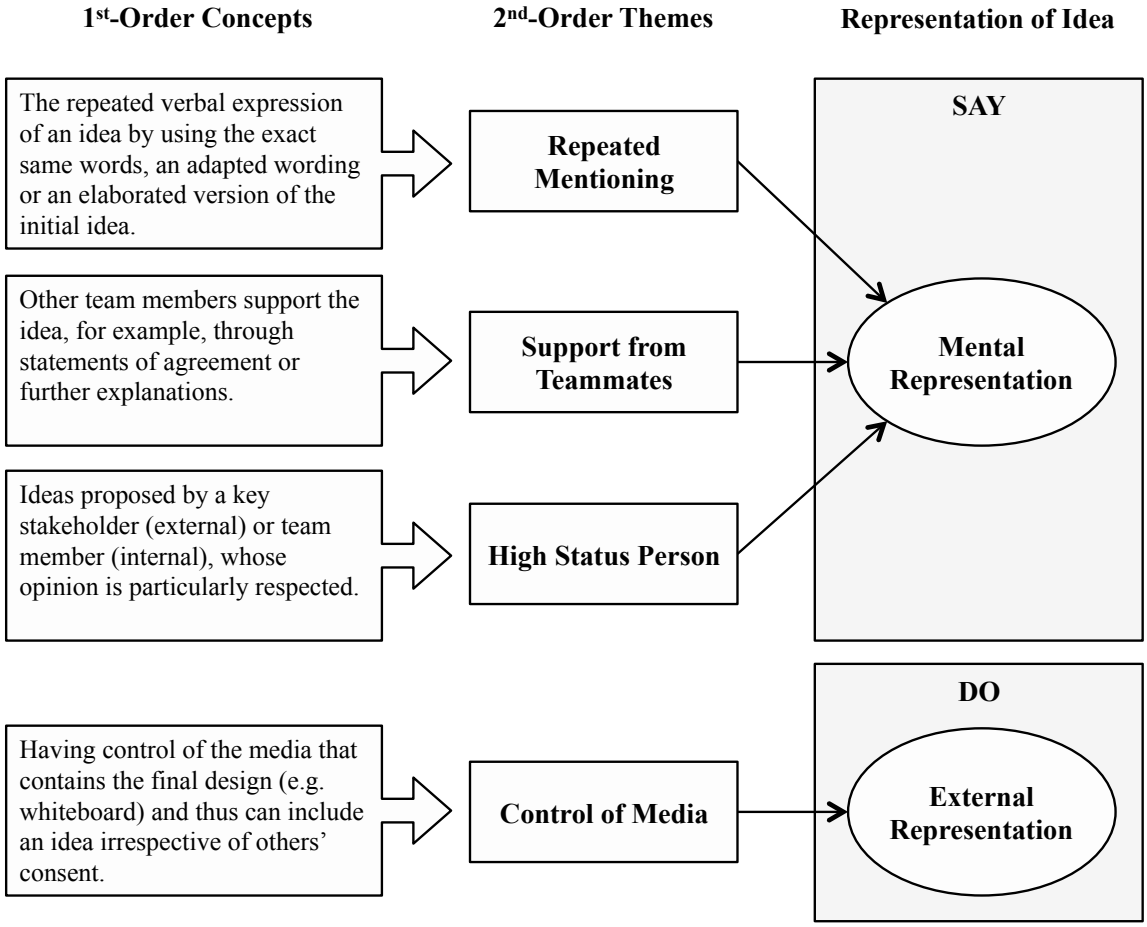

Figure 5. Overview of our emergent data structure
(Source: Own illustration)

5.6.2.3 Theorizing: Constructing Theory by Interrelating Theoretical Dimensions

In the third and final step, we advanced our second-order themes, i.e., our tentative conceptual categories, into theoretical categories, which we termed *dynamics* with respect to the observed phenomena in relation to group dynamics. Afterwards, we began theorizing about the possible reasons why the dynamics lead to idea inclusion. Thereby, we consulted increasingly the

scientific literature and iterated frequently between the data, our emerging theory and the literature.

In relation to the coding process and the hereupon construction of theoretical categories, it is very important to understand that the objective is neither to test a theory nor to build a theory based on solely logical reasoning about how phenomena could be explained or predicted. The objective of applying grounded theory methods and tools is to create a theory that is grounded in data (Thornberg, 2012, p. 252). Thereby, the iteration between data and theory altered our understanding of the world and helped us to gain a deeper understanding of the dynamic processes, activities, and behaviors involved in a team's elaboration and advancement of a proposed solution for a new mobile service.

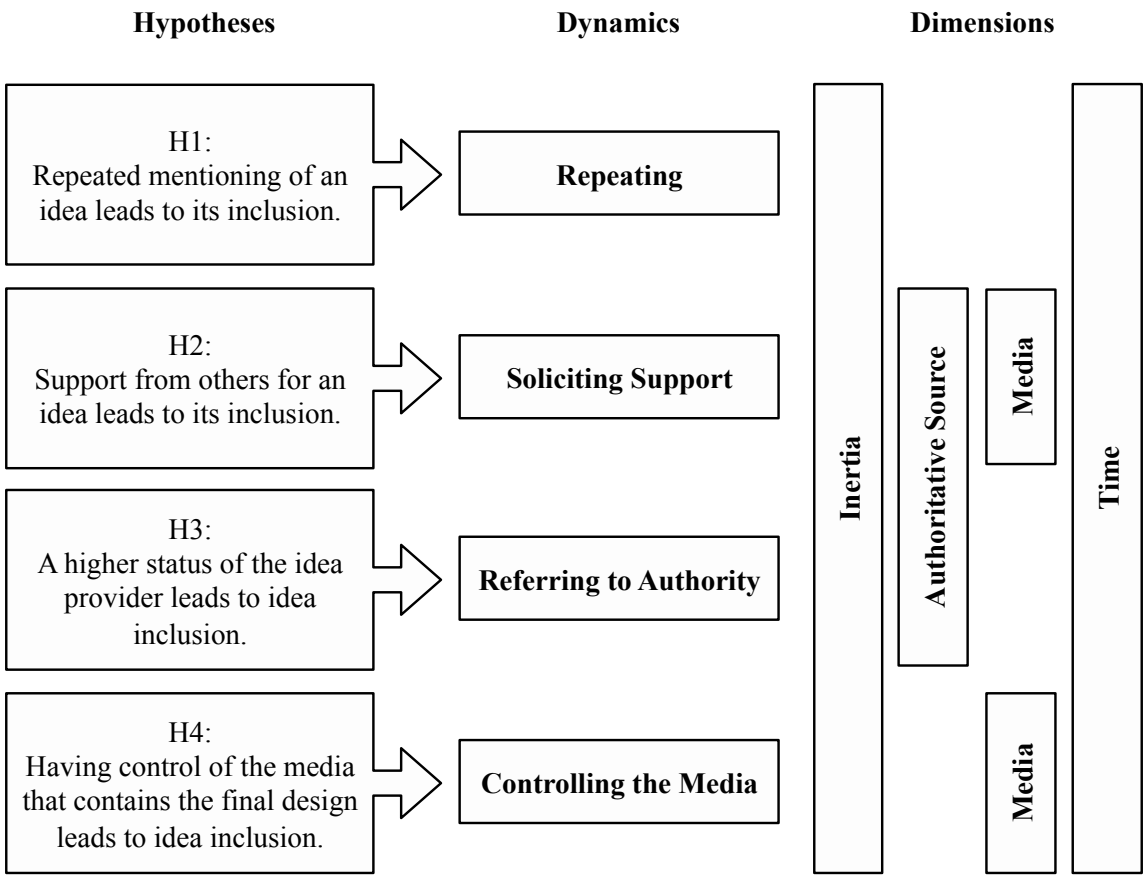

Figure 6. The dynamics underlying our hypotheses and their relations to the theoretical dimensions of our IAMT model
(Source: Own illustration)

First, we theorized about the underlying conceptual categories of our hypotheses. Accordingly, we created for each of the four hypotheses an abstract description of the theorized underlying conceptual categories, i.e., the dynamics (see Figure 6). In this respect, we followed Charmaz 's (2014, p. 245) advice and used gerunds in order to foster our theoretical sensitivity with respect to the involved processes and actions instead of getting stuck in static descriptions of topics. The dynamics were then used to theorize about the

relationships between them and to construct an explicit theoretical logic that explains why an idea gets included in the meeting result during a team meeting.

Second, we theorized about the forces that may foster or inhibit the inclusion of an idea in relation to the dynamics. Thereby, we used also the scientific literature as an analytical tool along the process (Thornberg, 2012, p. 252). That is, during the analysis and interpretation of the data in relation to the theorized dynamics, we tried to put our prior knowledge from extant theories aside in order to remain open to the leads about possible relationships in our data. During the theorizing about the possible relationships, we used extant theories to inform our theoretical considerations and to draw links between our theoretical interpretations of the data and other theoretical explanations of them with respect to the forces that foster or inhibit idea inclusion. This led us to the development of the IAMT model and the creation of the respective dimensions (see Figure 6): inertia (I), authoritative source (A), media (M) and time (T). Chapter 6 provides a detailed description of our respective findings and chapter 7 discusses our constructed IAMT model.

6. Findings

This chapter describes the findings of our empirical study on idea inclusion and exclusion during meetings of project teams. It presents the hypotheses that we formulated on the basis of analyzing five videotaped team meetings of three project teams. We used methods from interaction analysis (cf. Jordan & Henderson, 1995) to prepare and support the video analysis and coding. For the actual coding and interpretation of the data, we applied grounded theory methods according to Charmaz (2006, 2014). The findings presented in this chapter answer our second research question:

> **RQ2** Which possible factors in relation to group dynamics affect the inclusion of an idea into the shared result of a team that is working at a creative task during a meeting?

This chapter is structured as follows. The next section provides a summary of our findings and states the generated hypotheses. Each of the subsequent sections describes one of our hypotheses on factors affecting idea inclusion in relation to group dynamics. In these sections, we first describe the generated hypothesis in more detail. Second, we provide illustrative examples that support our hypothesis as well as illustrative counterexamples, if we found some. Finally, we discuss the respective hypothesis.

6.1 Overview of the Findings

Altogether it is found that a variety of group dynamics affect whether suggested ideas are kept or discarded. Our observations include dynamics in relation to the rhetoric strategies of team members, the influence of persons of higher status or the influence of team members on a team's decisions as well as the team's approaches regarding the shared use of the media that contains the final design. In addition, we noticed effects of a team member's motivation to exercise mental effort regarding the elaboration of a solution and the emergence of a team member who supports mainly his or her own suggestions.

Whether an idea, which is mentioned during a team meeting, is included or not influences the team's shared outcome of the meeting. Over the course of the project, this in turn influences the team's final design. Although it is not possible to assess how much more (or less) creative the final design would have been if an excluded idea would have been included, it is understandable that the fact whether an idea was included or not may have a decisive influence on the final result.

Our investigation on the inclusion or exclusion of ideas focused on the five videotaped team meetings, in which the teams elaborated their initial idea into a proposed solution. Whether a suggested idea was included in the outcome of a meeting or not is evident in the artifact that the team created during the meetings as well as by the observations in the video recordings. Reliable conclusions regarding reasons for the inclusion or exclusion of an idea beyond the scope of the videotaped team meetings are not possible with the available data. For example, we do not know how the team members behaved during their individual team meetings nor do we know who exactly created which part of the team's presentations or other artifacts. Although, due to our observations and conversations with the teams in the course of our

ethnographic observation study, we know more about how the initial ideas evolved into the final proposed solutions than only what happened in the videotaped meetings, we deliberately focused our study on the analysis of the videotaped meetings (see also section 5.1 for an explanation of the reasons for our decision).

In our study, we focused mainly on factors that lead to the inclusion of an idea but noticed also specific factors that counteracted its inclusion, and thus, lead to its exclusion. On the whole, we found numerous factors for why ideas are included in (or excluded from) a team's final design of a team meeting. Some of those reasons are justified in project related circumstances. For example, the team might come to the conclusion that it would be too laborious and time-consuming to implement a certain, not mission critical feature. Therefore, the team may decide in mutual agreement to leave it out for now. Another reason might be justified in the changed focus of the team's outcome. That is, the focus of the proposed solution might change due to the team's lessons learned based on the feedback they received from potential customers and possible investors. Therefore, certain features might have become irrelevant as the customer is unlikely to value those features or possible investors refuse them. Thus, inclusion or exclusion of ideas might be the result of detailed considerations and in-depth reflection.

However, humans have not only a bounded capability with regard to decision making in complex and uncertain situations (Simon, 1972, p. 176), rational decision making itself might sometimes not be the best option (March, 1982, p. 75ff). In matters of innovation, the development of goals through making choices that are followed by experiences might be more beneficial than the adherence to pre-existing goals. The former helps to broaden an individual's or group's scope and understanding of the world (March, 1982, pp. 72f, 75). The rigid pursuit of pre-existing goals through efficient problem solving limits the adaptability and flexibility necessary for the adaptation to new situations (Miller, 1973, p. 75f). That is, adaptability and flexibility are inherent requirements of innovation (Caldwell & O'Reilly, 2003, p. 500). Overall, no matter whether ideas are included or excluded due to rational decision making processes or not, it could be assumed that the reasons for this decisions are well-grounded in an individual's reasoning with regard to the product's design.

Besides the inclusion or exclusion of ideas due to reasons with regard to a product's design, social factors also affect whether an idea is included or not. It is not uncharted that social factors influence the generation and adoption of ideas in groups (Briggs & Reinig, 2010, p. 133). For example, Diehl and Stroebe (1987) studied the impact of evaluation apprehension, free riding and blocking on the productivity of brainstorming in groups. Their finings suggest that production blocking, i.e., the inability of group members to express their own ideas as they occur due to blocking effects because of other group members expressing their ideas (Diehl & Stroebe, 1987, p. 498), has the strongest negative effect on a group's productivity in terms of idea generation (Diehl & Stroebe, 1987, p. 507f). In addition, their findings suggest that both evaluation apprehension and free riding are only minor causes of productivity loss (Diehl & Stroebe, 1987, p. 507). Apart from the negative effects of social factors, Paulus and Brown (2007, p. 258f) also state the possible positive effects of social comparison, i.e., an individual's tendency to compare his or her performance with those of other members of a group (Festinger, 1954, p. 117f; Paulus & Brown, 2007, p. 258), on individuals' idea generation performance.

The aforementioned studies, however, focused on productivity gains and losses in groups due to social factors. In our study, we focused on the identification of reasons that facilitate or inhibit the adoption of an individual team member's ideas into the team's proposed solution. Even though we cannot say that the final product would be more creative if lost ideas would have been included, we can say that some of the lost ideas were excluded for no good reasons and might have made the product better. In addition, we found that many excluded ideas were excluded for group dynamic reasons and not because they did not match the product's design. The same is true for the inclusion of ideas, which is also prone to group dynamic effects and the influence of an individual team member's behaviors. To be clear, we do not suggest that the inclusion of each and every idea makes a product more creative or valuable, neither do we suggest that all included ideas are only included because of certain behaviors regardless of their relation to the team's goal and currently proposed solution. Our study only suggests that in team meetings an individual's behavior determines the inclusion or exclusion of an idea apart from rational arguments and conscious decision-making processes. With all the sophisticated attempts to improve the selection of the best ideas at the beginning of innovation projects (e.g. Dean et al., 2006; Girotra et al., 2010; Hennessey, Amabile, & Mueller, 2011; O'Quin & Besemer, 1989; Riedl et al., 2010) it is disturbing to see how subtle individual behaviors, group dynamics and external influences affect the inclusion or exclusion of ideas in team meetings.

Regarding the inclusion of ideas, we identified the following four influencing factors: (1) repeated mentioning of an idea (cf. H1), (2) support from other team members for an idea (cf. H2), (3) the higher status of the person who provided the idea (cf. H3), and (4) having control of the media that contains the final design (cf. H4). Table 9 provides an overview of the respective hypotheses as well as a short description of each hypothesis. The following sections describe our hypotheses in detail and provide for each hypothesis several illustrative examples as well as counterexamples from our study.

Table 9. Overview of the hypotheses on reasons for idea inclusion

No.	Hypothesis	Description
H1	Repeated mentioning of an idea leads to its inclusion.	The repeated verbal expression of an idea by using the exact same words, an adapted wording or an elaborated version of the initial idea.
H2	Support from other team members for an idea leads to its inclusion.	Other team members support the idea, for example, through statements of agreement or further explanations.
H3	A higher status of the idea provider leads to the inclusion of his or her idea.	Ideas proposed by a key stakeholder (external) or team member (internal), whose opinion is particularly respected.
H4	Having control of the media that contains the final design leads to inclusion of own ideas.	Having control of the media that contains the final design (e.g., whiteboard) and thus can include an idea irrespective of others' consent.

The following sections describe in detail our hypotheses on reasons for idea inclusion and provide for each hypothesis several illustrative examples from our study. Each chapter is organized as follows. First, we state and explain the respective hypothesis. Second, we provide examples from our study that support the hypothesis. Based on the inductive nature of our study, some of the examples provided here, led to the construction of the respective hypothesis in the first place. Others were identified during comparative processes, in which we searched for similar incidents and compared their effects with regard to idea inclusion. Third, we provide counterexamples for cases in which we found some. The counterexamples were also identified during the comparative processes and represent incidents that did not lead to the hypothesized effect regarding idea inclusion. Finally, we end each chapter with a discussion of our finding.

For each of the confirming and disconfirming examples, we provide transcribed segments to illustrate the described incident. These transcribed segments are not complete according to the standards of conversation analysis, as described, for example, by Jefferson (2004, pp. 24-31). For example, we do not indicate pauses or overlapping speech for the sake of a better readability. In addition, non-verbal interactions among team members or interactions between a team member and an artifact are only included if they are necessary to illustrate the observed incident with respect to the stated hypothesis. Even in cases, in which non-verbal activities are included it is done only in a coarse fashion that should help the reader to understand what was going on in the transcribed segment. This, too, is done for the sake of a better readability. Therefore, when reading the transcribed segments in this chapter it has to be kept in mind that the intention of the transcript is to illustrate the example and not for the purpose of data analysis.

6.2 Repeated Mentioning: Giving an Idea Several Times a Second Chance

Our first hypothesis on activities of a team member that facilitate the inclusion of his or her idea is concerned with the repeated mentioning of the respective idea. The project teams worked on an open-ended innovation challenge. Consequently, the teams faced the challenge that a great number of alternative solutions would be more or less equally suitable to solve the assigned design problem. At the same time, the teams lack firm criteria to assess the quality of the alternative ideas, which are mentioned in the group discussions. This is a common challenge of teams focused on innovation: they are faced with multiple and sometimes also conflicting interpretations regarding the determination of what an ideal solution is (Daft & Weick, 1984, p. 286; Goh et al., 2013, p. 160f). In addition, it is difficult for the team to predict how external stakeholder will evaluate their outcome, because the evaluation depends on unswayable environmental factors (e.g., a newly published mobile application that offers similar functionalities) as well as the evaluators' individual preferences (Goh et al., 2013, p. 161). For example, consumers of cultural products "[..] need familiarity to understand what they are offered, but they need novelty to enjoy it" (Lampel et al., 2000, p. 264). Similarly a manager, who should decided whether or not to pursue a proposed solution, needs the right balance between familiarity and novelty in order to make his or her decision. In both cases, however, it is very difficult for a team to determine in general the ideal amount of familiarity and novelty because of the varying experiences and preferences of the respective target group.

Yet not only stakeholders outside the team have to be convinced that an idea is worth the effort of its implementation but also the other members of the team. They, too, exhibit idiosyncratic preferences and make decisions based on their individual knowledge and experiences. Based on differences with respect to an individual's characteristics, such as personal innovativeness, creativity or openness to experience, some team member might be more open to creative, and therefore also unfamiliar, ideas than others. To confuse the issue even more, research findings suggest that a negative bias against creative ideas exists (Mueller et al., 2012, p. 13). Mueller, Melwani and Goncalo (2012, p. 16) found that people have difficulty to recognize creative ideas when experiencing uncertainty. In addition, they found that more practical and unoriginal ideas are preferred. Thus, creative individuals may experience difficulty in gaining acceptance for their creative ideas (Mueller et al., 2012, p. 16f). Repeated mentioning may counteract this negative bias by making the unfamiliar familiar and therefore facilitate the inclusion of creative ideas. Overall, as learning is guided by plausibility (i.e., being reasonable and therefore convincing) rather than accuracy (i.e., being near to the true value) (Weick et al., 2005, p. 419) repeated mentioning of an idea could facilitate its inclusion as the story behind the idea might seem rather plausible in the context of its later mentioning than when it was mentioned for the first time.

6.2.1 Hypothesis

Mentioning an idea repeatedly on several occasions makes even a novel idea appear more familiar and it might also help the member who wants to include the idea in the team's proposed solution to render the idea more plausible, and thus, increase its acceptance among the other members of the team. Yet, irrespective of the actual cognitive processes, we noticed in our observations that the repeated mentioning of an idea fosters its inclusion. Sometimes it was sufficient that a team member mentioned an idea several times during one meeting. Other ideas needed more persistence. They were mentioned in several meetings until they were included in the team's proposed solution. However, in both cases, we assume the same underlying mechanism, which led to the inclusion of the idea. Our first hypothesis is therefore:

H1: Repeated mentioning of an idea leads to its inclusion.

We found that the persistent pursuit of including an idea over the course of a single meeting or even over a longer period of time (e.g., repeatedly mentioning an idea in several meetings until it is finally included in the team's proposed solution) is a promising strategy to include ones ideas in a team's outcome.

However, the actual reasons for the eventual inclusion of an idea, which was repeatedly mentioned, are manifold. Some of the possible reasons might be that (1) with time the idea became more familiar and thus acceptable, (2) the arguments supporting the idea were perfected, or (3) in one of the later repetitions of an idea the team was more receptive to this idea. This is not an exhaustive list of possible reasons. Its purpose is only to point out that we assume that the repetition of an idea does not directly lead to its integration but rather creates favorable conditions for its integration. That is, the effect of idea inclusion due to repeated mentioning is mediated by a variety of factors that either can be positively influenced by repetition (e.g., make something become more familiar) or for which repeated mentioning

increases the likelihood of its occurrence (e.g., catch a suitable time for mentioning a certain idea).

6.2.2 Confirming Incidents

This section provides support for our hypothesis that the repeated mentioning of an idea facilitates its inclusion. As mentioned before, we found that the persistent pursuit of including an idea either over the course of a single meeting or over the course of several meetings is a promising strategy for team members to include their ideas in the team's outcome. Some of the ideas were mentioned verbatim over and over again. However, this need not always be so. We have also noticed analogous repetitions of ideas, which moved into the team's solution.

In the following sections, we describe incidents in which the repeated mentioning of an idea leads to the inclusion of this idea.

6.2.2.1 Frequently Repeated in a Short Period of Time

The instance described in this section occurred during team TripAssistant's work on solving the first task (see section 5.4.5.4 for a description of the meeting task and the template provided for the one-sentence pitch). The objective of the task was to formulate a concise description for the team's proposed solution. That is, the result should describes the team's product in terms of its target audience, the solved problem and their unique selling proposition. The description should, on the one hand, inform outside investors on a general level about the team's product. On the other hand, it should be engaging. That is, it should generate the desire for gaining more information about the product.

This paragraph provides a brief description of what happened in the meeting (see also the respective transcript extract in Table 10). M2 mentions her idea for the unique selling proposition (i.e., the secret sauce in the one-sentence pitch template) of the team's product for the first time at about minute 19 of the team meeting. She mentions her favorite idea alongside another idea, of which she might know from previous team meetings, that some of her teammates are in favor of. M2 mentions two possible unique selling propositions: (1) inclusion of more criteria for hotel booking based on individual preferences and (2) improved navigation to the surroundings at the business traveler's destination. Her main focus is on the integration of her second suggention into the one-sentence pitch. Both suggestions are not completely new to the team as they were already a part of the team's argumentation in the 2nd idea presentation about what features make their solution superior to existing ones. M2 mentions that she is in favor of having only one unique selling proposition and that she thinks that navigation to the surroundings provides more value compared to the inclusion of more criteria for hotel booking. M2 undertook several attempts to convince her teammates of the second unique selling proposition. Within a time span of less than three minutes, she mentioned the idea of navigation to the surroundings five times. When M2 repeated this idea for the forth time, M4 was the first who exhibited consent to the idea. After M2 had repeated her idea the fifth times it was picked up by M3. M3's mentioning of the idea received approval form M1 and M4. After M2 mentioned the idea the sixth time it was finally integrated in the team's solution for the one-sentence pitch.

Table 10. Idea of M2: navigation in an unknown environment (Transcript extract: meeting task 1; team TripAssistant)

M2: I don't know. I've now. At the moment for me there are two unique selling propositions what we discuss. First is that we provide a larger criteria for search and second is we have the navigation what. Because normal they have the map but they don't have the uh how you say? Augmented reality part to navigate around the surroundings. So maybe. (0:19:16.0)

M1: Can I see [NOTE: M2 turns her laptop to M1 and M1 is looking something up]

[…] [NOTE: M2 and M1 look up slides on the laptop computer that state the team's previously phrased unique selling proposition. M1 suggests to just combine all theses aspects and integrate it as the secret sauce in the one-sentence pitch]

M2: I would only pick one and I would. Comparing more specific criteria that just means that we have a maybe larger database and I think the augmented reality part is more like advanced technology and, I don't know, may sound more convincing for me. (0:20:50.3)

M4: Yeah. Uhm. One other question that just came to my mind is uhm we have by solve a problem to find a suitable hotel regarding their needs

M3: individual

M4: individual needs or wishes. Should we add for a business trip? To specify which needs. That's mainly done.

M2: I think because in the pervious we already wrote down business travelers. (0:21:18.2)

M3: Yeah.

M1: and with more …

M4: Yeah. Ok. Ok.

M1: it has other needs to- for sightseeing.

M4: Yeah [NOTE: erases a part from his individual solution on his working paper]

M2: But I'm thinking actually about this [NOTE: pointing at something on her laptop]. Should we add this to what problem we are solving? Supporting in an unknown environment. (0:21:39.3)

M1: Is this the problem we are solving in our app? (0:21:45.4)

M4: Yeah. Maybe uhm that is actually the problem that we are solving. (0:22:04.7)

M2: mhm.

M3: What?

M4: Uhm. To help the business traveler uhm in an unknown environment right from the beginning.

M3: from the beginning (0:22:17.0)

M1: mhm.

M4: And how are we doing this. By find a suit uhm? Find a suit uhm?

M3: find a suit uhm? Find a suit uhm?

M2: OK.

M3: It's yeah.

M4: So finding this- the suitable hotel

M2: To help

M3: Regarding their individual needs. And uhm and navigating to the points of interest using augmented reality

M4: and data fusion.

M3: and data fusion.

M4: Something like this. (0:22:45.5)

M2: Ok. Then you write (0:22:47.0)

M3: What was the problem? That's here (0:22:50.4) [NOTE: referring to the slides on the laptop]

M2: But to help (0:22:51.2)

M1: in solve a problem part or in secret sauce part?

M3: No we thought now this should be in the in the in the

M2: problem

M3: problem part

M2: What problem we are doing also navigation so it's not only about searching hotel.

M1: So the sentence should be to help the business traveler (0:23:13.1)

M4: uhm (0:23:14.2)

M2: in an unknown environment (0:23:16.3)

M4: yeah but then maybe we can uhm

M1: to find a suitable hotel in an unknown environment

M4: uhm say to not just help. Helping

M2: helping (0:23:26.5)

M4: with what? With orientation

M3: Yeah (0:23:29.7)

M2: Yeah

M4: somehow to

M2: help the business

M4: not only have the the this help standing alone (0:23:36.5)

M2: also what? Help business travelers orient in an unknown environment (0:23:44.3)

M3: Yeah. (0:23:45.2) [NOTE: looks at M4 and how he reacts]

Besides the repeated mentioning of the navigation idea by M2, the idea received also support from M3 after it was mentioned five times before. Therefore, in this case a competing hypothesis for idea inclusion would be H2 (i.e., support from others for an idea leads to its inclusion). Yet, prior to M3 picking up the idea it was repeatedly mentioned by M2. That is, the initial activity that facilitated the inclusion of this idea was M2's constant mentioning of the idea in various forms over a short period of time. In addition, in the subsequent discussion on the exact formulation of the solutions, M2 repeated her idea in various forms, too. Thus repeated mentioning might be the more suitable hypothesis as a reason of idea inclusion.

6.2.2.2 Persistence over an Extended Period of Time

The instance described in this section occurred during team A2B's work on solving the third task (see also chapter 5.4.5.4 for a description of the meeting task). During this meeting, the

team discusses the core functionality of their proposed mobile service and creates screen mockups for the respective mobile application. Therefore, the teams were asked in the pervious assignment (see also the description of the 4th assignment in chapter 5.4.5.2) to create user stories and choose the 10 most important stories. The most important user stories should be used as a starting point for the discussion and creation of the relevant mockups.

This section provides a brief description of what happened in the meeting (see also the respective transcript extract in Table 11). A3 is sketching screen mockups according to considerations that the team previously had. For some parts, he even copies a screen mockup, which was created for the 2nd idea presentation. Meanwhile, A2 tries to include additional features in the proposed solution. Right at the beginning of the meeting, A2 tries to include his idea of turning the application into a personal assistant by suggesting a start screen that focuses on the user's appointments. A3, however, makes a counterproposal. He suggests having the possibility to manually input start and destination of a route on the start screen. Having that said, he sketches the mockup for the start screen according to his own vision. After a couple of minutes, A2 starts a new attempt by referencing one of the user stories. Based on the user story, he mentions the notification feature in form of a count down and A3 includes it in the appointment part of the start screen. Shortly afterwards, A2 suggests to also have push notifications that tell the user when to leave. Again, both A1 and A3 show consent with A2's idea and A3 includes it in the screen mockups.

Table 11. Idea of A2: notification feature
(Transcript extract: meeting task 3; team A2B)

A2: Das heißt, der Start-Screen wäre das wo du drauf hast deine Termine und dass der aktuelle markiert ist? (0:02:27.6)
[NOTE: A3 starts drawing the mockup for the start screen of their mobile application]
A3: Ich würde jetzt eher sagen, dass von A nach B (0:02:32.3) [NOTE: draws two rectangles]
A1: Das ist jetzt die Frage (0:02:35.2)
A3: Also quasi (0:02:36.5) [NOTE: proceeds drawing the screen mockup]
[...]
A2: Wenn wir uns jetzt [NOTE: turns around and goes to his laptop, which is set up on the opposite side of the room, i.e., across of the whiteboard] einmal an die User Stories halten (0:04:51.2)
[NOTE: A1 turns and looks at A2; A3 keeps sketching on the whiteboard]
A2: I want to know when to leave (0:04:53.7)
[NOTE: A3 also turns to A2]

A2: Das heißt, dass du vielleicht auf der Startseite anzeigst was deine nächste Aktion ist. Ich meine Favoriten schön und gut. Dass du halt schnell hast "jetzt will ich nach Hause" es hat sich irgendwas geändert. Aber das du halt hier zum Beispiel so einen Countdown hast [NOTE: goes to the whiteboard and points at a part of the skeched start screen] nächster Termin hier [NOTE: points at the appointment part of the sketched start screen] (0:05:07.7)

A3: OK (0:05:08.4) [NOTE: A3 integrates A2's suggested countdown in the appointment part of the sketched start screen]

A2: und du musst jetzt in drei- in drei Minuten musst du dich in Bewegung setzen. Wenn du da drauf klickst dann klappt sich was aus und sagt ok du musst da und da hinlaufen. Oder so und so sieht die nächste Reise aus. Das du halt wirklich- das hat- wir wollen ja eher ein Assistent werden. Nicht eine Sache die du halt nutzt (0:05:21.4)

A1: Ja (0:05:21.8)

A2: wenn du sie halt brauchst, dass du sagst ok jetzt von A nach B, sondern das Ding sagt dir ok jetzt musst du raus oder du musst 10 Minuten früher los weil da ist zähfließender Verkehr. Ahm. Oder gibt dir eine Push-Mitteilung. Du hast einen neuen Termin bekommen in deinen Kalender kurzfristig du musst jetzt da und da hin. (0:05:38.9)

A1. Mhm (0:05:39.4)

A2: Also wenn man diese diese Features mit rein nimmt, dann hat man glaub ich einen viel viel höheren Mehrwert für den Nutzer als wenn du sagst ok das kannst du mit Google Now teilweise machen das kannst du mit der MVG-App machen. Du kannst auch schnell bei DriveNow rein gehen und gucken wo ist das nächste Auto. Dass du halt diese ja diesen automatischen Assistent hast, den du immer in der Hosentasche hast und der meldet sich halt zack hier. Beispielsweise. Also das wäre schon cool. (0:06:01.4)

[NOTE: A2 looks at A3's sketch of the mockups. A3 is still engaged in sketching the mockups. Currently he is drawing a mockup for A2's suggested push notification]

At a first glance, it seems counterintuitive why this is an example for repeated mentioning. Even though A2 talks a lot in the example above, he mentions the notification feature not too often. Especially, compared to the previous example in which M2 mentions her idea five times within a time span of less than three minutes. A2’s idea, however, has to be put in a wider time frame. Already in the second meeting, A2 mentioned the notification feature several times without achieving its inclusion (cf. section 6.2.3.1 which describes the unsuccessful attempts of A2 to turn the overall product into a personal assistant with one of its features is the notification feature). In the third meeting, A2 starts a new attempt to include the notification feature and succeeds this time. That is, at least the notification feature becomes integrated in the meeting result. However, A2 did not succeed with integrating the overall idea of the mobile application as a personal assistant. At first, A2’s idea was only to

have a notification feature and then he evolved the idea into an even bigger idea: that of the personal assistant. While A2 succeeded with the inclusion of the notification feature due to repeated mentioning, he failed so far to include the relatively new idea of turning the application into a personal assistant. This might also be due to the fact that A3 pursues a different objective, as he wants to build an application for the instant calculation of intermodal routes. A2, on the other hand, likes the idea of creating an automated personal assistant that makes all the necessary route calculations and the planning of trips in the background and offers the user a service similar to the one usually only an actual personal assistant would provide. A1, to whom A2 explained the idea of the personal assistant on several occasion, seems also to be increasingly attached to A2's vision of creating a personal assistant.

6.2.3 Disconfirming Incidents

This chapter provides contradicting evidence for our hypothesis that the repeated mentioning of an idea facilitates its inclusion. As stated in the previous section, we found that the persistent attempt to include an idea (either over the course of a single meeting or over the course of several meetings) is a promising strategy for team members to include their ideas in the team's outcome. Yet, we also found instances in which the repeated mentioning of an idea was no help in a team member's pursuit to include his or her idea in the team's final design. We noted that behaviors of other team members, which could be hypothesized leading to idea exclusion, overrule sometimes the idea inclusion due to repeated mentioning. For example, ignoring, i.e., other team members are not considering a proposed idea, counteracts repeated mentioning when it is applied equally persistent as the repetition of an idea. Ignoring is seemingly especially effective for keeping an idea out of the team's proposed solution if the team member, who creates the artifact that contains the final design, does not consider the proposed idea.

In the following sections, we describe a series of incidents in which the repeated mentioning of an idea was not successful with respect to the inclusion of the idea.

6.2.3.1 Non-Consideration of Deviant Goals Prevented the Inclusion of an Idea based on Repeated Mentioning

Over the course of the idea development and elaboration phase, A2 tried to alter the core idea of team A2B. Initially, the team agreed on the development of a "platform for intermodal navigation" (i.e., the team's offering as stated in their one-sentence pitch as the result of the first meeting task). The team's main objective is improving the transparency of the available means of transportation to travel from A to B within a city. Thereby, they want to provide the user with the possibility to combine various means of transportation on a single trip by calculating an optimal intermodal route based on the user's travel preferences. A3, who is the team leader, prefers the ad hoc calculation of a route (i.e., the user specifies his or her destination and the application calculates different route options for traveling from the current location to the specified destination). By contrast, A2, who took over the roles of the designer and the economist in the team, increasingly prefers the integration of a functionality to plan a trip in advance. In the second meeting, he mentions for the first time his preference for the integration of the functionality for "planning [a trip] ahead". In addition, A2 also mentions

that a functionality to notify the user when he or she has to leave would be interesting. Both, A1 and A3 agree with A2's overall suggestions with regard to the users' pains and gains (see also the description of the second meeting task in chapter 5.4.5.4). Table 12 provides the extract of the respective incident during the team's work on the task of the second meeting. In this transcript extract, the team discusses the current pains (i.e., a description of the important pain points that the team's persona faces regarding mobility on a business trip) and future gains (i.e., a description of the strategies that may help the team's persona to achieve his or her goals) of the persona (i.e., a fictional character that describes the personal characteristics of a certain type of user along with important behavior patterns, goals, attitudes and environmental factors), whose needs they intend to address with their mobile service.

Table 12. Ideas of A2: planning ahead and notification feature (Transcript extract: meeting task 2; team A2B)

A2: Ok. Find ich gut. Vielleicht müssten wir noch die transparency mit rein bringen. Das ist halt der pain. Das es einfach intransparent ist was es alles gibt und wie es funktioniert, wie es zusammenhängt. Weil Transport heutzutage ist ja oftmals ne gemischte Angelegenheit, du machst ja nicht nur ein Transportmittel. Ich mein irgendwie Öffentliche. Da mischt man es oft durch aber genau wie komm ich von A nach B. Ich finde die Stichworte vielleicht, dass man transparency und so weiter noch mit rein bringt und dass man halt planning ahead weil das ist glaub ich auch wichtig. Das du halt vorher weißt, ich brauch so und so lang und kannst dann halt entspannt das machen was du willst weil du sagst, ok jetzt. Vielleicht könnte die App auch irgendwie „Dingdong" machen, dass sie sagt, jetzt musst du los gehen. Das du halt vorher eingibst, du musst zu der und der Zeit da sein, gib mir die billigste und schnellste Route und die sagt dir halt jetzt musst du los gehen und der nächste Schritt ist, du läufst da hin, checkst da ein und machst das und das. So step by step. Was halt idiotensicher das Ganze gestaltet. Da wär gut und Ähm. Genau. Und obstacles vielleicht, dass er bisher noch keine Lösung gefunden hat die das in entsprechendem Maße berücksichtigt, seine Probleme. (0:24:03.8)
[NOTE: A1 signals agreement during A2's monologue by occasionally making 'mhm' sounds]
A3: OK (0:24:06.1)
A2: Das, das man halt die Stichworte, Lösungen so weiter mit rein bringt. Ähm, Risiken. Ja gut, wenn der Service gut ist, dass man sich halt komplett drauf verlassen kann. Aber das is ja eigentlich kein Risiko. (0:24:24.1)
A3: Ok, dann schreibe ich es auch auf. (0:24:28.2)

In addition to the description of the persona and his or her pains and gains, the team also has to create a user journey, in which they visually describe how a business traveler would use the team's proposed mobile service. The user journey solely focuses on the ad hoc calculation of trips from point A to point B but provides no clues to the possibility of planning a trip in advance. Furthermore, in the presentation and discussion of the meeting's results with the

teaching assistant (TA), A1 describes only the mobile application's functionality of planning a route in an ad hoc manner (e.g., A1 mentions that "[…] at each location in the user's daily schedule, from which he or she wants to proceed to the next appointment our app is there to help him or her."[15]). A2 adds to A1's explanation also the fact that the user wants to plan ahead and that their application will support this, too (A2 says that "[the user] also wants to plan ahead. [...] and the application notifies him or her when to leave in order to arrive at the next appointment in time."[16]). Even though A2 mentions his ideas of planning ahead and the notification feature for a second time it is not yet integrated in the team's proposed solution.

In the next meetings, A2 continues with his attempts of integrating his ideas (planning ahead and notification) through repeated mentioning. In the team's discussion about the core features of their mobile application during the work on the task of the third meeting, A2 proposes the calendar synchronization feature, which is an improved version of his initial ideas. The calendar synchronization feature combines the functionality of planning ahead and the notification functionality. In addition, this feature should work as a learning system. That is, it adapts its behavior to the preferences and behaviors of the user. A2 tries to integrate this idea during the team's discussion about the design of the start screen or their application. A3 takes over the part of drawing the mockup. A1 and A2 provide suggestions, which A3 then either integrates in the mockup or not. Even though A3 mentions the integration of a functionality to display upcoming calendar items ("Here then you have the next appointment, which one has in its Google Calendar."[17]), the design of this feature does not correspond with A2's stated vision of the calendar synchronization feature. Still, the main focus of A1 and A3 seem to be on the ad hoc route calculation based on the users manual interaction with the application. In contrast, A2 seems to prefer an application that automatically suggests the user possible routes based on his or her calendar entries. A3 dismisses A2's suggestion of the calendar synchronization with an evasive statement: A3 rejects A2's suggestions by saying that "[he] would do it with as few as possible drop downs, because those things are always a pain in mobile applications". After A3's dismissive statement regarding A2's suggestion, A3 and A1 continue to elaborate their vision of the application. A2 leaves the discussion, sets up his laptop and turns it on. Again, A2's strategy to include his idea by mentioning it time and again was not successful. In this case A3's control over the media that contains the final design (cf. H4 in section 6.5) seems to overrule A2's verbally arguing for his idea. Table 13 provides the respective extract of the transcript for the incident described in this paragraph.

Table 13. Idea of A2: calendar synchronization as a combination of his two previous ideas planning ahead and notification
(Transcript extract: meeting task 3; team A2B)

A2: Das heißt, der Start-Screen wäre das wo du drauf hast deine Termine und dass der aktuelle markiert ist? (0:02:27.6)

[15] This is an analogous translation of A1's utterance with grammatical corrections for a better readability.

[16] This is an analogous translation of A2's utterance with grammatical corrections for a better readability.

[17] This is an analogous translation of A3's utterance with wording corrections for a better readability

[NOTE: A3 starts drawing the mockup for the start screen of their mobile application]

A3: Ich würde jetzt eher sagen, dass von A nach B (0:02:32.3) [NOTE: draws two rectangles]

A1: Das ist jetzt die Frage (0:02:35.2)

A3: Also quasi (0:02:36.5) [NOTE: proceeds drawing the screen mockup]

A1: Also dass man vielleicht standardmäßig seinen aktuellen Standort vielleicht haben

A2: mhm (0:02:43.0)

A1: Das schreibst du eh gerade? [NOTE: addressed to A3; A1 looks at A3's drawing] Ja

A3: Ja.

A1: Genau. (0:02:45.6)

A3: Aktueller Standort. Hier dann vielleicht [NOTE: points at a part of the screen mockup], entweder halt, dass man hier dann den nächsten Termin hat. Sozusagen.

A2: mhm

A3: Den man in seinen Google Calendar hat. (0:02:55.6)

A1: Könnte man denn hier [NOTE: points at a part of the screen mockup] vielleicht das Ganze etwas kürzer machen und da zwei Felder hin entweder Ziel oder akueller der nächste Termin oder so was oder aus den letzten Zielen, aus den Favoriten auswählen oder sowas könnte man halt noch ne Option- (0:03:08.1)

A3: Die Favoriten würde ich einfach hier darunter machen (0:03:09.8) [NOTE: draws the respecitve part in the screen mockup]

A3: oder man

A1: Ja, das könnte man auch so machen. (0:03:11.8)

A2: Die aktuelle Route sollte eigentlich darunter. Du hast ja. Was ich jetzt herausgehört habe ist, dass der- Du weißt ja schon ungefähr was du willst. Und durch die Kalendersynchronisation. Das Feature ist halt ziemlich geil. Wenn du halt weißt das Ding lernst langsam dazu. Ok. Dieses Meeting ist da und da und da steht zum Beispiel schon ein Raum dran oder eine Adresse, dass ähm (0:03:29.8)

A3: Ich würde es halt möglichst ohne Aufklappen machen, weil das ist immer ätzend wenn man (0:03:33.7)

A2: Ja genau. Das ist (0:03:35.1)

A1: Das ist (0:03:35.6)

A3: Könnte man zum Beispiel sagen man hat einfach hier oben [NOTE: points at a part of the screen mockup] den aktuellen Standort. Hier könnte man jetzt entweder (0:03:40.5)

A1: manuell was rein schreiben (0:03:42.0)

A3: Ja (0:03:42.4)

A1: zum Beispiel einmal die Adresse. (0:03:43.4)

[NOTE: A2 leaves the discussion at the whiteboard and goes to his backpack. He pulls out his laptop and sets it up while A1 and A3 proceed with their discussion and the advancement of the screen mockup of the start screen]

A couple of minutes later, A2 starts a new attempt to integrate his idea. This time, he frames it more explicitly as personalized automated assistant, which provides information not only on request but rather provides the necessary information automatically when it is needed. Therefore, A2's assistant functionality comprises three of his previously mentioned ideas (planning ahead, notification, personalization) and combines them in a way that is intended to provide an enhanced value for the user. While A3 is still sketching the screen mockups according to his vision of the application without paying too much attention to A2's suggestions, A1 increasingly engages in discussions with A2 about possible designs and additional features. In addition, A1 seems to be more and more supportive to A2's ideas. Moreover, what is especially noteworthy: A3 includes A2's idea of the notification feature in the mockup. This suggests that at least one of A2's idea gains support through its repeated mentioning. Yet, his advanced idea of turning their mobile application into a personal assistant is still not completely accepted by all team members. Table 14 provides the respective extract of the transcript for the incident described in this paragraph.

Table 14. Idea of A2: personal assistant that combines his previous ideas of planning ahead, notification, and personalization
(Transcript extract: meeting task 3; team A2B)

A2: Wenn wir uns jetzt [NOTE: turns around and goes to his laptop, which is set up on the opposite side of the whiteboard] einmal an die User Stories halten (0:04:51.2)

[NOTE: A1 turns and looks at A2; A3 keeps sketching on the whiteboard]

A2: I want to know when to leave (0:04:53.7)

[NOTE: A3 also turns to A2]

A2: Das heißt, dass du vielleicht auf der Startseite anzeigst was deine nächste Aktion ist. Ich meine Favoriten schön und gut. Dass du halt schnell hast "jetzt will ich nach Hause" es hat sich irgendwas geändert. Aber das du halt hier zum Beispiel so einen Countdown hast [NOTE: goes to the whiteboard and points at a part of the skeched start screen] nächster Termin hier [NOTE: points at the appointment part of the sketched start screen] (0:05:07.7)

A3: OK (0:05:08.4) [NOTE: A3 integrates A2's suggested countdown in the appointment part of the sketched start screen]

A2: und du musst jetzt in drei- in drei Minuten musst du dich in Bewegung setzen. Wenn du da drauf klickst dann klappt sich was aus und sagt ok du musst da und da hinlaufen. Oder so und so sieht die nächste Reise aus. Das du halt wirklich, das hat, wir wollen ja eher ein Assistent werden. Nicht eine Sache die du halt nutzt (0:05:21.4)

A1: Ja (0:05:21.8)

A2: wenn du sie halt brauchst, dass du sagst ok jetzt von A nach B, sondern das Ding sagt dir ok jetzt musst du raus oder du musst 10 Minuten früher los weil da ist zähfließender Verkehr. Ahm. Oder gibt dir eine Push-Mitteilung. Du hast einen neuen Termin bekommen in deinen Kalender kurzfristig du musst jetzt da und da hin. (0:05:38.9)

A1. Mhm (0:05:39.4)

A2: Also wenn man diese diese Features mit rein nimmt, dann hat man glaub ich einen viel viel höheren Mehrwert für den Nutzer als wenn du sagst ok das kannst du mit Google Now teilweise machen das kannst du mit der MVG-App machen. Du kannst auch schnell bei DriveNow rein gehen und gucken wo ist das nächste Auto. Dass du halt diese ja diesen automatischen Assistent hast, den du immer in der Hosentasche hast und der meldet sich halt zack hier. Beispielsweise. Also das wäre schon cool. (0:06:01.4)

[NOTE: A2 looks at A3's sketch of the mockups. A3 is still engaged in skeching the mockups. Currently he is drawing a mockup for A2's suggested push notification]

In the subsequent part of the third meeting, A3 still pursuits his vision of a mobile application that provides intermodal route navigation and is used in an ad hoc manner, i.e., the user specifies manually his destination and the application calculates instantly several alternative routes. For example, about 15 minutes after the integration of the notification feature, A2 suggest that the application should always show the most relevant screen. That is, like an assistant presents his or her boss the most relevant information according to the current situation, the application should automatically display the screen with the information that a user is most likely to request (e.g., information about the next appointment before a trip or information about the next change during the trip). A1 considers the idea. Yet, it is not included in the team's design for several possible reasons. First, A3 has control over the media that contains the final design (cf. H4 in section 6.5) and he is currently not paying attention to the discussion between A1 and A2. Therefore, A3 does not even consider A2's idea because he keeps himself busy with the integration of his own ideas in the mockup, which he is just drawing. As mentioned before, non-consideration of an idea by the team member who has control over the media that contains the final design seems to have a stronger effect regarding the exclusion of an idea compared to the verbal activity of repeatedly mentioning an idea.

In the fifth and last meeting before the team had to present their proposed solution to the corporate partner in the interim presentation, A2 starts yet another attempt to establish the assistant functionality as the core feature of their mobile application. At first, he mentions the functionality again and seeks approval for it by his teammates. However, A3 sharply disagrees with A2's suggestion and insists on having routing as the core feature. A3 suggests some aspects, which A2 should write down for the desirable version of their application. A2 gives in and writes A3's suggestion down. Table 15 provides the respective extract of the transcript for the incident described in this paragraph. Again, A2's repeated mentioning of the idea was not successful.

Table 15. Idea of A2: personal assistant as the core functionality of the team's mobile application
(Transcript extract: meeting task 5; team A2B)

A2: Desirable ist die gesamte App (0:17:22.3)
A2: Ok, also ich würd sagen dieser Assistent der dir sagt jetzt musst du los laufen. Das ist glaub ich das sinnvollste Feature.
A1: Ja aber-
A3: Eigentlich das Routing. Das Routing ist das Kern-Feature. (0:17:37.8)
A2: Aber du schaffst ja jetzt schon das Routing mit MVG
A1: Ja das ist
A2: und myTaxi kriegst du auch hin. (0:17:41.8)
A3: Dann schreibst du halt das Routing mit den- mit allen verfügbaren, also halt wirklich MVG, Carsharing
A1: Kombinationen
A2: Also routing comparison (0:17:50.8) [NOTE: writes at the whiteboard]

About 10 minutes later, A2 changes his strategy. Instead of verbally seeking approval by his teammates for the integration of his idea regarding the assistant functionality, he just adds it to the list of the feasible features and explains it afterwards again. This happened during the team's discussion about possibly still missing aspects of their solution for the task of this meeting. While A1 and A3 discuss what kind of features belong to the feasible or desirable version of their proposed solution, A2 adds the assistant functionality as an additional feature to the feasible solution. Table 16 provides the respective extract of the transcript for the incident described in this paragraph.

Table 16. Idea of A2: personal assistant as feasible functionality of the team's mobile application
(Transcript extract: meeting task 5; team A2B)

A2: Eigentlich ist feasible and desirable- gut. Feasible ist was machbar ist und was- (0:27:54.6)

A1: und was vielleicht, das [NOTE: pointing at the desirable part] sehe ich eher so für die Zukunft und das [NOTE: pointing at the feasible part] sehe ich eher so, also das können wir durchziehen im Rahmen des Projekts.

A2: Absolut. (0:28:00.7)

A3: Obwohl. Naja, [NOTE: pointing at the desirable part] da steht ja schon dabei das es egal ist ob man es implementieren kann oder nicht. Also ich würde das was wir implementieren können aber halt wichtig ist, das gehört schon auch zu desirable. (0:28:10.9)

A2: Calendar sync, user interface [NOTE: reads what was already written on the whiteboard], ja genau dieser Assistent [NOTE: writes Assistant on the whiteboard] Das ist halt der Punkt. Ich glaub ich hab das ja schon erzählt: Du hast 30 Apps meistens auf dem Handy und von denen nutzt du halt 10 im nähren Fokus und wie kommst du halt in diesen Fokus rein. Und wenn du halt einen Assistent hast der dich halt nicht nervt sondern der halt nur sinnvoll ist- das ist halt schon- (0:28:33.5)

A1: mhm (0:28:33.9)

A2: Das ist halt, wenn du morgens auswählst den Termin mach ich, den Termin mach ich, den Termin mach ich. So in einer an/aus-Klick Liste. Das er dich halt nicht nervt dass er sagt jetzt musst du los. So ein Tagsplan am Anfang. Diese Termine hast du und welche nimmst du wahr. Ja ich würd sagen: nachwievor wie immer top [NOTE: starts laughing] wir sind fertig. [NOTE: A3 laught, too] (0:28:59.2)

In previous discussions, A1 and A3 partly showed agreement for the inclusion of the assistant feature. The major difference between A2's point of view and that of his teammates is, however, the perception of the importance of this feature. A2 perceives it as the most important feature, whereas A1 and A3 perceive it as an add-on and see the intermodal navigation functionality as the most important feature. Nonetheless, with the inclusion of the feature by writing it down in the meeting's solution, A2 made good progress in his attempts to include it in the team's final design. Therefore, controlling the media that contains the meeting's final solution (cf. H4 in section 6.5) lead to the inclusion of A2's idea. Yet it could be still argued that A2's repeated mentioning of his idea has set the basis for the integration of the idea in this meeting.

6.2.4 Discussion

Research findings suggest that creative ideas are prone to rejection because of a bias against creativity (Mueller et al., 2012, p. 16f). In the discussion of their results they state "[…] people have difficulty gaining acceptance for creative ideas, especially when more practical and unoriginal options are readily available […]" (Mueller et al., 2012, p. 17). This supports Mandler's (1995, p. 21) statement that on a first encounter creative ideas are frequently evaluated negative as well as Blair and Mumford's (Blair & Mumford, 2007, p. 215f) finding that people preferred unoriginal ideas compared to original ideas in the selection of ideas for further development. Boudreau, Guinan, Lakhani and Riedl (2016) made a similar finding in their empirical investigation of factors that affect an evaluators assessment of grand proposals for research universities. They found that "[…] evaluators systematically give lower scores to research proposals that are closer to their own areas of expertise and to those that are highly novel" (Boudreau et al., 2016, p. 2765). That is, novel ideas are more prone to rejection compared to mundane ones not only in economic institutions but also in the area of university research.

Yet, as empirical and theoretical considerations show, novel contributions have their roots in existing knowledge, which is then recombined in new ways and possibly also includes ideas from different domains (Boudreau et al., 2016, p. 2768). For example, a recent empirical study on the factors that affect the impact of scientific publications suggest that embedding novel ideas in a "[…] primarily highly conventional combinations of prior work […]" (Uzzi, Mukherjee, Stringer, & Jones, 2013, p. 471) increases the likelihood of receiving an unusually high number of citations. Therefore, the authors conclude that right balance between novel ideas and established knowledge facilitates the inclusion of new ideas in many scientific domains (Uzzi et al., 2013, p. 471). In addition, they found that teams are more likely than individuals to introduce novel ideas into familiar knowledge domains (Uzzi et al., 2013, p. 468).

Just as embedding novel ideas in established knowledge seems to facilitate the absorption of the novel aspects of an idea, we found that also repeatedly mentioning new ideas foster their inclusion. When one hears something for the umpteenth time it begins to sound more familiar and less strange. Therefore, the other members of a team might feel less objective against the new idea. In addition, hearing the ideas of another team member repeatedly could also lead to new own associations or increases the expected benefit of remembering this idea (Leggett Dugosh & Paulus, 2005, p. 319).

In addition, novel ideas inherently exhibit a high amount of uncertainty and ambiguity, which adds to the ambiguity of the team's proposed solutions, too. Therefore, embracing each and every new idea at a first glance might not be the wisest strategy for a team. By earning its way into the solution through repeated attempts of its inclusion gives an idea also the chance to evolve. This was not observed in each instance. Sometimes, ideas are stubbornly repeated over and over again until they were excluded in agreement of the rest of the team or included for one or another reason. For example, if an idea was simply missed by other team members when mentioned for the first (several) time(s) due to their occupation with other tasks, the repeated mentioning of that idea could facilitate its inclusion as at one of the repetitions it might be mentioned at a more suitable time, i.e., a time when other team members are

receptive for that idea. Another reasons could be, that a team member includes an idea in the meeting result after it was mentioned several time to keep the team member, who stated the idea, from repeating it, i.e., including the idea either to please the one who mentioned it or to stop him or her from repeating it. Yet, in several instances we noticed an advancement of the initial idea until its final inclusion in the team's solutions. Thereby, either the idea itself was elaborated, and thus, was made more valuable or feasible, or the argumentation in favor or the idea has been improved. In either of both ways, repeatedly mentioning of an idea increased its maturity. Overall, the one who finally includes the idea in the meeting result, i.e., the artifact that is created during the meeting, can also take the chance and alter the written or drawn representation of the verbally expressed idea to suite his or her own objectives. Thus, although repeatedly mentioning an idea facilitates directly or indirectly its inclusion, the included version of the idea might not represent all aspects of the verbally expressed version of the idea. Yet, nothing keeps the one who mentioned the idea from including it in the teams result after he or she has the consent of his or her teammates.

In addition, to the hypothesized reasons and effects of repeatedly mentioning an idea, we want now also briefly discuss playfulness, as a possible personality characteristic that may foster this strategy. Playfulness is defined as an individuals' "[…] predisposition to frame (or reframe) a situation in such a way as to provide oneself (and possibly others) with amusement, humor, and/or entertainment" (Barnett, 2007, p. 955). Yet, according to Brown and Vaughan (2009, p. 6) playfulness does not only positively affect happiness and enjoyment, but is also a critical capacity with respect to social relationships, creativity and innovativeness. Playful behavior can foster involvement in an activity and therefore may stimulate team members to work longer (Starbuck & Webster, 1991, p. 72f). Thereby, playfulness might positively influence an individual's intrinsic motivation. By framing or reframing an activity in a way that makes it more joyful, the engagement in the activity may be perceived as self-rewarding and thus increases an individual's intrinsic motivation to engage in the activity.

Therefore, our argumentation for a possible positive influence of playfulness on innovation is as follows. With regard to innovation, the management scholar Peter F. Drucker stated: "If diligence, persistence, and commitment are lacking, talent, ingenuity, and knowledge are of no avail" (Drucker, 2002, p. 102). Other researchers, too, emphasized the pivotal role of persistence on innovation. For example, Howell (2005) found that people, who effectively promoted an innovation idea, exhibited among other things the characteristic of "[…] persisting in the face of adversity" (Howell, 2005, p. 108). In this respect, intrinsic motivation, which is a crucial element of creativity (Amabile & Pillemer, 2012, p. 8), and the voluntary pursuits of an idea, which may lead to a high level of emotional attachment to an idea (Mainemelis, 2001, p. 559; 2010, p. 566), could foster an individuals' persistence in pursuing one of his innovative ideas.

In addition to persistence, resilience may be another important characteristic of a person, who repeatedly mentions an idea in the face of explicit rejection, non-consideration or ignorance. Again, a high level of playfulness may facilitate an individual's resilience because of his or her capability to positively reframe situations (Barnett, 2007, p. 955). For example, in a study on coping with stress, Magnuson and Barnett (2013) found that "[…] individuals who were high in playfulness experienced less perceived stress and engaged more frequently in adaptive

coping styles than their less playful peers" (Magnuson & Barnett, 2013, p. 139). Their results show that playful individuals apply more frequently engagement-focused coping styles, i.e., being focused on solving the problem or applying emotion-focused coping such as seeking support, accepting the problem or restructure it cognitively (Carver & Connor-Smith, 2010, p. 685), in contrast to rather ineffective coping strategies such as avoidance, disengagement, denial or wishful thinking (Carver & Connor-Smith, 2010, p. 685f). In addition, in their book on play Brown and Vaughan (2009), too, draw a link between playful behavior and being resilient and adaptable. Therefore, playful team members might be more resilient as they apply superior strategies (e.g., positive reframing) to cope with the adverse situations of experiencing rejection or disregard by others.

With respect to our observed case, A2, M2 and T3 exhibit the highest playfulness values. In addition, A2 and M2 perceive themselves as being more creative than others, whereas T3 believes he is less creative as others. Both, A2 and M2 express many own ideas over the course of the project and also apply behaviors such as repeatedly mentioning own ideas to get their ideas included in their team's outcome. This behavior is not as pronounced for T3. He is more concerned with animating others to express creative ideas and thereby facilitating group work on the tasks. Thus, an individual's perceived level of creativity might moderate the hypothesized positive relationship between his or her playfulness and repeatedly mentioning own ideas in spite of resistance and other adverse conditions. In addition, we would also not argue that playful individuals are in general more likely to assertively pursuit their ideas, but rather that playfulness provides them with superior strategies to cope with rejection or disregard by others. That is, playful individuals might be better equipped in the event that they want to impose ideas against oppositions.

Another possible explanation for the successful integration of an idea by repeatedly mentioning it could be based on minority influence theory (cf. Wood, Lundgren, Ouellette, Busceme, & Blackstone, 1994). The literature on research findings regarding minority influences suggest that "[…] minority consistency of arguments over time is likely to lead to change in majority views in groups" (West, 2003, p. 262). That is, the more consistently an individual repeats his or her idea the better the chances for its inclusion. We also noted this in our observations. For example, in the two examples that confirmed our hypothesis the ideas were rather consistently repeated, whereas the idea in the disconfirming example evolved and thereby changed considerably over the course of its repetition. Yet, also in this case the effect of consistency becomes evident. Over the course of the team member's repeated mentioning of his continuously evolving idea, those parts of the idea that remained the same for some iterations were included in the solution whereas new aspects remained excluded.

6.3 Support from Others: the Decisive Majority

Our second hypothesis on group-related reasons for the inclusion of an idea addresses the effect of support from other team member. As mentioned before (see, for example, sectioin 6.2) the project teams worked on an open-ended innovation challenge. This setting is characterized by the possibility to think of a variety of possible solutions in combination with a lack of firm criteria to select the best solution (cf. Daft & Weick, 1984, p. 286; Goh et al., 2013, p. 160f). To make things even worse, the evaluation of a team's proposed product by external stakeholder (i.e., in this case the teaching team and employees of the corporate

partner) depends on unswayable environmental factors (e.g., a newly published mobile application that offers similar functionalities) as well as the evaluator's individual preferences (Goh et al., 2013, p. 161). Therefore, it is difficult for the teams to predict how external stakeholders may react to their proposed solution.

Yet, not only external stakeholder but also each team member applies his or her idiosyncratic preferences in evaluating the ideas of others. Thereby, a team member's idea may facilitate the implementation of another member's idea and therefore is supported. Alternative reasons for the support of another team member's idea are amongst others that the idea seems to be beneficial for achieving the team's or an individual's overall goal, is perceived as a valuable feature, sounds plausible in terms of the argued relevance, or simply was stated by a team member with whom one sympathizes. In our research, we do not investigate the underlying reasons why a team member supports the idea of another team member. We only found in our observations that the support of others is a further group-related reason for the inclusion of an idea.

6.3.1 Hypothesis

Ideas that are supported by at least another team member different from the one who proposed the idea were more likely to be included. Thus, support from other team members affects the inclusion of an idea. Our second hypothesis is therefore:

H2: Support from other team members for an idea leads to its inclusion.

Teamwork is per definition characterized by individuals working on interdepended task to achieve a common goal and produce an outcome for which they are jointly responsible (Cohen & Bailey, 1997, p. 241; Hackman, 2002, p. 249; Katzenbach & Smith, 1993, p. 112). Therefore, the support of another team member's idea is actually not extraordinary, especially not for cases, in which rather mundane ideas are proposed. Some ideas, however, do not simply suggest an additional feature that could be included in the final product or a slight deviation from the proposed route, but fundamentally affect the team's goal and outcome. The inclusion of those ideas, hence, would be remarkably.

The observed meetings took place during the idea generation and elaboration phase of the project. During this phase, a team's proposed solution is intentionally still in a flux. That is, a team should alter its proposed solution according to new knowledge gained during the work on the various tasks and assignments. However, we noticed that individual team members were not equally receptive to new ideas. Especially in cases in which a newly proposed idea contradicted or conflicted with the attempted idea of another team member, the other team member acted against the inclusion of the new idea. This was even observable for cases, in which we, as external observes, found the newly proposed idea more suitable in terms of the feedback the teams received from external stakeholder. Similar to the findings of Baer and Brown (2012) regarding the effect of individual's experiencing the feelings of psychological ownership, individuals were more receptive to suggestions that build on their ideas or added new features that were in accordance with their vision of the final product than to suggestions that may replace, and thus, exclude their ideas or conflict with their vision of the final product.

6.3.2 Confirming Incidents

This section provides support for our hypothesis that support from other members of the team tends to result in idea inclusion, unless other forces act against it. As stated in the sections on our hypotheses regarding repeated mentioning (see chapter 6.2), we found that persistent attempts (either over the course of a single meeting or over the course of several meetings) for including an idea are a promising strategy for team members to get their ideas included in the team's outcome. In light of our observations that an idea is included because of others supporting its inclusion, we could also argue that repeatedly mentioning an idea only facilitates gaining the support from others, which is then the actual cause of its inclusion. Yet, we decided to describe both hypotheses on their own as we think they exhibit distinct behaviors of members to influence the outcome of a team.

In the following chapters, we describe incidents in which support from at least another team member lead to the inclusion of an idea.

6.3.2.1 Two are of the Same Opinion

The instance described in this chapter occurred during team A2B's work on solving the second task (see chapter 5.4.5.4 for a detailed description of the second meeting's task). In the second meeting, the team had to complete two related tasks. The first task was about the creation of a persona. The second task was about the creation of a user journey, i.e., a compelling story, in which they illustrate how the persona would benefit form using their product. A2 and A3 worked in parallel on different parts of the first task while A1 created the user journey. Afterwards, the team discussed their individual solutions and collaboratively improved them.

This section provides a brief description of what happened in the meeting (see also the respective transcript extract in Table 17). Right before the observed instant, in which the support of another team member led to the inclusion of an idea, A2 suggested to included the functionality of planning ahead. So far, A1 and A3 favor an application that provides the user with the functionality of instantly calculate an intermodal route from the user's current location to his or her next destination. With A1's negative answer to A2's for the umpteenth time proposed idea, A2 seems to be upset about his repeated failure of shaping the team's product according to his vision. This might be the reason, why A2 declines A1's offer to alter the user journey by adding or removing some parts. A2 takes the statement of A3 that they have only little time for the completion of the result, and focuses on the final description of the persona. A3 takes the opportunity and mentions that he would also include the estimated costs in the user journey. A3 proposed the cost estimation feature already in the first meeting. At that time, however, A2 refused to include this feature into the team's outcome. Now, with A2 being upset and demonstratively not considering his teammate's discussion, the feature gets included because A1 supports A3's idea. A1 mentions that he thought already about including the estimated costs and A3 adds this feature to the user journey.

Table 17. Idea of A3: cost estimation
(Transcript extract: meeting task 2; team A2B)

[NOTE on what happened before: A1 and A2 discussed whether to included also A2's proposed functionality of planning ahead or only focus on instant route calculation.]
A1: Also wir können gern noch das ein oder andere dazwischen schieben oder raus machen.
A2: Ja, das passt ja schon. Wir haben eh überhaupt keine Zeit mehr. (0:33:46.6) Ich schreib jetzt mal den ganzen Kram hier auf. (0:33:48.5)
A3: Ja. Ich würd einfach noch. Ich würd es vielleicht noch ein bisschen abkürzen und dafür- Wir müssen ja noch unsere App irgendwie das mit den Kosten rein bringen. Das wir halt meinetwegen sagen, ja hier äh, zum Hotel nimmt seine App und sagt dann halt ok, Tram Dauer 5 Minuten kostet irgendwie 1 Euro 30.
A1: Stimmt. Die Kosten (0:34:04.7) Ja, das stimmt. Ja, das ist richtig. Die wollt ich nämlich auch da noch drüber schreiben über des (0:34:10.1)
A3: Das man jetzt sagt, hier- keine Ahnung. Hotel, jetzt ähm nimmt er sein Handy raus und sagt halt ok, die verschiedenen Wege und dann nimmt er halt die Tram. 1 Euro 30. 5 Minuten. (0:34:28.8) [NOTE: integrates the described part into the outcome]
A1: mhm (0:34:30.1) Ja. (0:34:31.7)

A2 seems to be upset because his team members do constantly not take up his ideas of planning ahead and turning the mobile application into a personal assistant. With his mentioning that they do not have any time left for further discussion but have to create the final solution now, he might pursue the objective to gain control over the media that contains the final result (see also chapter 6.5 for a discussion of the effect of having control of the media on idea inclusion). In the first meeting, A2 achieved to have control of the content that was included in the final result, and thus, could shape it according to his opinion. In this case, however, A3 seems to embrace A2's decision to refrain from further discussions. A3 keeps in control of the sheet of paper that contains the user journey and agrees with A1 on the inclusion of the estimated costs feature. It would be interesting to know, what would have happened if A1 refused A3's idea. As A3 has currently the sheet of paper with the user journey, he could include his idea even in the face of A1's dissent. Yet in this case, A1 supports the idea of A3 and only then A3 includes it in the team's outcome.

6.3.2.2 Collaborative Elaboration of an Idea

The instance described in this section occurred during team Tripster's work on solving the third task (see chapter 5.4.5.4 for a detailed description of the third meeting's task). In the third meeting, the teams were asked to collaboratively create a low-fidelity prototype of their mobile application in form of simple screen mockups. The created prototype should show the mobile application's key features based on the respective screen mockups as well as a general

flow through the individual screens of the application (cf. Rudd et al., 1996, p. 78). It is critical that the team achieves a shared understanding about the features of their mobile application because other parts of their proposed solution depend on these features (e.g., the possible kinds of revenue streams). Therefore, the team worked on a whiteboard as shared drawing area for the design of the screen mockups (Schrage, 1990, p. 98).

This section provides a brief description of what happened in the meeting (see also the respective transcript extract in Table 18). Right before the described scene, the team discussed the behavior of the application (e.g., what happens if one clicks on a trip, what happens if one click on AR view). During this discussion the team noticed that they have different opinions regarding the application's behavior. Based on this insight they wanted to rename a certain element of their application's user interface (i.e., the AR view button). The team stood for a while in front of the whiteboard and though of a proper name. As they could not think of a better name right now, T3 suggestes to do something else first and proposes a new idea.

T3 proposes the idea to include a filter option in the enjoy mode (i.e., a part of the application that provides the user with information about waiting time activities nearby, e.g., coffee shops or restaurants). T3 suggests this new feature by asking his teammates for possible solutions how it could actually look like. T4 supports the idea and makes suggestions on how to include it. Afterwards, mostly T3 and T4 are discussing different options. At first only T3 has the pen and includes suggested design solutions in the mockup and then asks his teammates about their opinion. T3 and T4 simultaneously discuss the content of the filtering option and sketch different possibilities. T1 also joins briefly the discussion and makes some contributions. T2 has at first only observed the discussion between T3 and T4 and then joins it actively and makes suggestions. Later on T4 also uses a pen to illustrate his ideas. Mostly T3 and T4 discuss and elaborate T3's initial idea while T2 is watching them. At the end they end up with three buttons: info, filter, and option.

Table 18. Idea of T3: filtering options in enjoy mode
(Transcript extract: meeting task 3; team Tripster)

[NOTE: team thinks of a better (i.e., more to the point) name for the AR view button]
T3: OK let's do that later. Do something else first. OK? (0:24:39.5) [NOTE: T4 mumbles something inaudible in parallel to T3]
T4: Yes, OK.
T3: How about filtering? [NOTE: points at the mockup for the enjoy mode] We need probably
T4: an option to filter
T3: Yeah.
T4: uhm

T3: So should we just put an option here or do we have options somewhere else or? [NOTE: T3 has a pen in his hand. T3 is pointing at parts of the screen mockup for the enjoy mode]

T4: Yeah. I will like put some extra option button [NOTE: points the part of the screen mockup where he would put the option button]

T3: extra option button [NOTE: skeches some buttons according to T4's information]

T4: or some [NOTE: observes what T3 is sketching] and the options yeah to filter something (0:25:02.0)

T2: But are options there or only

T3: This is like trains [NOTE: proceeds sketching]

T2: because you know you can have got more options than

T4: Yeah. You click it and you go to another screen [NOTE: supports his utterance by pointing actions at the whiteboard] just with options

T3: [NOTE: sketches a screen according to his interpretation of T4's description] something like what?

T4: Filter. Mayby add review or of the uhm (0:25:26.2)

T1: Food type? (0:25:26.9)

T4: Yeah. Food type. Yeah, maybe if you are a vegetarian (0:25:31.9)

T1: Or price range (0:25:33.4)

T3: Is this all in the review?

T1: No separate.

T4: No no no it's are other options. (0:25:39.4)

T3: OK [NOTE: changes something in the screen mockup] But that's not options. (0:25:44.0)

T4: Like uhm

T3: That should be in the info [NOTE: pointing at the respective part of the screen mockup]

T4: It uhm oh It's all in filter like food type and the other stuff. If you click filter, there is another uhm (0:25:56.2)

T3: Yeah. Filter should be like another option [NOTE: draws something]

T4: should be another option and if you choose the filters, filters should also show up here [NOTE: points at a part of the screen mockup]

T3: OK

T4: Like what did you choose uhm only pancake or something [NOTE: T3 laughs] and you should all, you should have the option maybe to choose the if you want to uhm find restaurants that only serve coffee or find a restaurant that maybe don't uhm OK don't is a stupid idea because that or you

T2: No uhm an exclusive search yeah. (0:26:33.7)

T4: You want to find yeah is it relevant? (0:26:38.1)

T2: Yeah, OK, but to distinguish the offers what [NOTE: goes to the whiteboard and points on something] because we can build a few categories here (…) or something like this that each advertisement should have a few codes to categorize it and then somebody will just, in filter will be the poll to add anything that the user wants. If he looks for coffee it will be coffee and then it will learn what you looked at previously.

T3: I think we need another- an extra filter [NOTE: sketches his idea]

T2: Yeah it's possible. Of course!

T3: I think we need filter as an extra button because this is too important to have it in a submenu

T2: Yeah. (0:27:25.7)

T4: Yeah. We should really think about what is the most important because we do have much space. Maybe like info about uhm the info should be only if you click uhm for example OK uhm (0:27:44.0)

T3: Yeah the info only appears if you have already clicked on something [NOTE: makes a click gesture at the respective part of the screen mockup]

[NOTE: T3, T4 proceed with the collaborative development of T3's initial idea until they agree on a screen mockup with three buttons: info, filter, and option; T2 watched them] (0:28:55.5)

In this case the support from others seems to have the strongest influence regarding idea inclusion. Especially T3's and T4's collaborative elaboration of T3's initial idea facilitates the inclusion of T3's idea. T3 cleverly involves his teammates in the elaboration of the idea while

still having a significant influence on its design because he is mostly the one who draws the sketches for the suggested tentative solutions. The fact that mostly T3 draws the respective sketches indicates that the observed scene may also be influenced by H4 (see section 6.5 about the effect of controlling the media that contains the final design). Yet the team's collaborative work on the elaboration of this idea, T3's unselfish way in which he sketches the idea (i.e., he asks other about their opinion and is more or less only the team's executing hand) and T4's occasionally sketching activities suggest that the support from other teammates has the main stake in facilitating idea inclusion in this case. Overall, it has to be mentioned that team Tripster shows most of the time a healthy collaborative behavior over the course of this meeting (i.e., a mix of challenging and supporting ideas of the other team members).

6.3.3 Disconfirming Incident

This section provides contradicting evidence for our hypothesis that the support from other team members for an idea facilitates its inclusion. In the following sections, we describe an exemplary incident, in which an idea was not included in the team's outcome, although other team members supported the idea in addition to the one who originally proposed it.

6.3.3.1 Too Early, too Easy and too Ephemeral

The instance described in the following sections occurred during team Tripster's work on solving the first task (see chapter 5.4.5.4 for a description of the meeting task and the template provided for the one-sentence pitch). The objective of the task is to formulate a concise description for a proposed solution. That is, the result should describes the team's product in terms of its target audience, the solved problem and their unique selling proposition. The description should, on the one hand, inform outside investors on a general level about the team's product. On the other hand, it should be engaging. That is, it should generate the desire to learn more about the product.

This section provides a brief description of what happened in the meeting (see also the respective transcript extract in Table 19). After a brief discussion about the task, the team members decided to first familiarize themselves with the requirements for a good one-sentence pitch. T1 is the first who provides an initial proposal for a solution. When he stumbles with the expression of the secret sauce T3 supports him by providing the phrase "live image feed". T1 likes the completion of his sentence and also T4 states that he likes it. Therefore, with no disagreement three in four team members like T3's suggested idea. However, when T2 criticizes another part of T1's proposed solution (i.e., "business traveler") the team focuses on this part and T3's idea gets lost, even though the majority of the team has already agreed on it.

Table 19. Idea of A3: live image feed
(Transcript extract: meeting task 1; team Tripster)

T1: It's not so difficult, I guess. (0:04:29.6) [NOTE: T2 and T4 are still reading the task instruction; T3 is listening to T1]

T1: I would, I would write my company tripster is developing mobile application to help business travelers track their train uhm with uhm (0:04:44.3)

[NOTE: T2 and T4 are now also ready]

T3: Live image feed (0:04:46.0)

T1: Yeah. (0:04:47.0) [NOTE: T3 laughs]

T1: Exactly. (0:04:49.5)

T4: I like live image feed

T2: Bud in fact our application is not limited to uhm

T1: Business travlers

T2: because everybody can use it

T3: Yeah.

T2: every traveler, traveler, traverlers (0:04:59.3)

Spoken words are rapidly fading away in team discussions. A conversation, in contrast to the team members engaging in sketching on a shared space, has no memory (Schrage, 1990, p. 98). Yet, also the team member's memory is limited with respect to the ability to remember each and every idea. Therefore, among other things, persistent representations help humans not only to process more complex thoughts (Kirsh, 2010, p. 449f) but also to store and exchange ideas with collaborators (Schrage, 1990, p. 98). As the idea in the example above was mentioned at an early point in the meeting, it got seemingly forgotten and was replaced by other ideas later on.

6.3.4 Discussion

Groups are complex, adaptive and dynamic systems (McGrath, 1997, pp. 14-16) in which the individual members of the group may influence the cognitive and motivational processes of the other members (Paulus et al., 2012, p. 330). The interdependence and mutual influence is even stronger in project teams because they work on the creation of a collective work product for which they are individual as well as mutually accountable (Katzenbach & Smith, 1993, p. 113). Therefore, it is not surprising that teams exhibit a strong tendency to reach consensus (Nemeth & Nemeth-Brown, 2003, p. 64). This is also reflected in our hypothesis that the support from other team members facilitates idea inclusion. Supporting another team member's idea could be though of as a good indicator for showing consent.

In its extreme form, a group's strive for consensus can have disadvantageous effects as argued by Janis (1972, 2015). Janis (2015, p. 184) coined the negative connoted term groupthink, which is seen as a result of group pressures and refers to the dominance of seeking concurrence in groups with high cohesion and strong direct leadership to the detriment of appraising alternative solutions or other courses of action. Many experimental studies of conformity lend support to the findings from Janis' (2015) analysis of policy decision-making, which states in essence that members of a group are reluctant to voice dissent and feel a strong pressure for consensus (Nemeth & Nemeth-Brown, 2003, p. 65). With regard to our study, groupthink may be an additional factor that influences the observed correlation between the support from other teammates and idea inclusion (see also chapter 6.4 regarding the effect of high status persons on idea inclusion).

Besides groupthink also majority influences could be an explanation for our observed finding. The teams were rather small with three to four members. Therefore, when another member supports an idea then at least half of the team is seemingly in favor of this idea. Asch's (1956) classic study of conformity demonstrated the critical effect of a unanimous majority on a peer's independence in decision-making. The consequences of majority influences can be explained by (1) the belief "[…] that the majority must be correct […]" (Nemeth & Nemeth-Brown, 2003, p. 65) and (2) the fear of rejection or making a fool of oneself when maintaining a minority position (Nemeth & Nemeth-Brown, 2003, p. 65). Thereby, the judgments of others may also be used as a proxy for own decisions in cases in which others are believed to be competent and motivated to make a correct or at least beneficial decision (Deutsch & Gerard, 1955, p. 635).

With respect to creative work, group induced conformity can hamper the quality of the resulting outcome. Or expressed conversely: "[…] *a healthy dose of conflict [..] plays an important role in fostering innovation"* (Dyer & Song, 1998, p. 505 italics in the original). The assumed strength of teams compared to individuals results from the mix of diverse experiences and knowledge, which is necessary to solve complex problems (Paulus et al., 2012, p. 327). Therefore, conflicting individual opinions, which are based on the diverse points of view of the team members, can lead to superior solutions (Nemeth & Nemeth-Brown, 2003, p. 71f). Research findings in the context of new product development suggest that especially constructive conflict positively affects the resulting product's business success (Dyer & Song, 1998, p. 505). In our observations, we noted that a mix of challenging and supporting the ideas of other team members is seemingly beneficial. In particular the collaborative elaboration of a team member's preliminary idea seemed to improve its quality (cf. Blohm et al., 2011). Even though the support from other teammates in form of possible initial dissent and subsequent collaborative elaboration of an idea would be beneficial with respect to the quality of the idea, this is not necessarily the only form of support that leads to idea inclusion. We found also instances, in which it was sufficient for the inclusion of an idea that an additional team member showed consent with the expressed idea of another teammate.

Overall, we found that, irrespective of the actual reasons for supporting the idea of another team member, the support from additional team members for an idea promotes the inclusion of this idea. However, it should be mentioned at this point that we found also hypotheses for idea inclusion that strongly counteract the hypothesized effect of support form other team members. For example, even if another team member supports an idea verbally, it might not

be included because the one who controls the media that contains the final design (see H4 in chapter 6.5) does not like the idea (e.g., the proposed idea deviates too much from the attempted proposed solution of the one who controls the media) or is occupied with the creation of a representation for another idea, and thus, cannot consider and/or include this idea. Nonetheless, we deem the observed effect of support form others on idea inclusion an important observation that is worth mentioning because in some cases the pure agreement of another team member seems to be sufficient for the inclusion of an idea.

6.4 High Status Person: the Decisive Minority

Our third hypothesis on reasons for the inclusion of an idea in the proposed solution of a design team addresses the effect of the idea provider's status. Ideas that are proposed by a higher status person (e.g., a manager or in our case the lecturer, a teaching assistant or an employee of the corporate partner), who is known to be one of the persons evaluating the team's final result, affect the team's outcome in terms of idea inclusion and exclusion. While feedback and suggestions of a higher status person can affect both idea inclusion and exclusion, we found that teams rather tend to include foreign idea that add new features to the team's solution as opposed to adhering to subtractive feedback, i.e., suggestions to exclude one of the team's own ideas. This observation is in line with extant research findings (e.g. Baer & Brown, 2012).

At the start of a project, a team that works on open-ended innovation challenges usually has only a limited informative basis regarding an evaluator's idiosyncratic preferences and his or her opinion about the team's tentative solution (cf. Goh et al., 2013, p. 161). Over time, the project team can achieve a better understanding of the evaluators' preferences and opinions based on the feedback the team receives on their tentative solution. During feedback sessions as well as in the question and answer part after presentations, an evaluator may not only criticize a team's tentative solution or give it a favorable opinion. He or she might also recommend the inclusion of new features or suggests altering an existing feature in a certain way. In situations, in which a team is dependent on an evaluator's opinion and suggestions, and thus, has to adhere to them, mostly a group's tendency to deviate from obligations affects the inclusion or exclusion of the evaluator's ideas. In our case, the teams had a high level of autonomy with regard to their final outcome. Only the kind of deliverables was predetermined. For example, the team had to create a prototype of their mobile application as well as a promotional video, which illustrates the use of their mobile service. Regarding the design of their mobile services and respectively their mobile application, they could freely choose whether they take on or decline ideas from external stakeholders.

6.4.1 Hypothesis

We found that even in the case of teams with a high level of outcome autonomy, ideas of a higher status person affect the teams' outcome via the teams' tendency to include his or her ideas. Our third hypothesis is therefore:

> *H3: A higher status of the idea provider leads to the inclusion of his or her idea.*

We did not especially focus on the teams' response to feedback from external stakeholder. However, we noticed in some of the teams' discussions about certain ideas that those ideas came from outside the team. After we noticed this, we also looked at the teams' discussions with the lecturer and teaching assistants after the team meetings in order to identify the source of the respective idea. We noticed that especially ideas that add a feature to a team's proposed solutions were taken on.

The higher status of people from outside the team depends on some kind of hierarchy or rather a unilateral relationship of dependence. For example, the teams' grades depended on the lecturer's evaluation of their deliverables. Even though the grading was irrespective of the creativity of the teams' final product, it took amongst other things into account how well the teams described their course of action in the project journal and how convincing they presented their proposed solution. Therefore, the knowledge that the one, who provided an idea that in his or her opinion would improve the team's tentative solution, also evaluates the team's final result may have influenced the team's decision regarding its inclusion.

The setting, in which we observed this phenomenon, is in many aspects different compared to the context, in which project teams operate in companies. Yet, the influence of a higher status person on a team's outcome is analogical in companies if the higher status person has also a say in the evaluation of the team's outcome. For example, if we think of a manager, who will at some point in time decide whether the team's project will be continued or abandoned.

In addition, we noticed that not only people from outside the team may be perceived as higher status persons but also certain members of the individual teams. We noticed in each team one team member that seemed to have more decision making power than his teammates. This was evident, for example, by the fact that the other team members tended to ask this one team member what he or she thinks about their idea. In this situations consent led mostly to the inclusion of the proposed idea, whereas dissent led mostly to the, at least temporary, exclusion of the proposed idea. It was also found that these team members had a major say in dicussions about the teams' course of action and their joint goals. In the case of team A2B, the team leader (A3) exercised the greatest decision-making power. In both of the other teams, the designers (i.e., M2 in team TripAssistant and T4 in team Tripser) exercised the greatest decision-making power.

6.4.2 Confirming Incidents

This chapter provides support for our hypothesis that a higher status of an idea's originator facilitates the inclusion of this idea. Depending on whether the originator of the idea is a team member or not, different additional behaviors mediate the actual inclusion of the respective idea. The former examples describe and discuss instances in which the originator is not a member of the team but rather in the position of a supervisor without direct authority. That is, the originator of the idea is of a higher status but his or her responsibility is rather in giving advice than instructions. The latter examples describe and discuss instances in which the originator of the idea is a team member, who seems to have, for reasons we do not know, more decision-making power than his or her teammates.

In the following sections, we describe incidents in which the fact that a person of a higher status proposed an idea boosted the inclusion of this idea.

6.4.2.1 Ideas from the Lecturer

The instance described in this section occurred during team TripAssistant's work on solving the third task (see section 5.4.5.4 for a detailed description of the third meeting's task). In the third meeting, the teams were asked to collaboratively create a low-fidelity prototype of their mobile application in form of simple screen mockups. The created prototype should show the mobile application's key features based on the respective screen mockups as well as a general flow through the individual screens of the application (cf. Rudd et al., 1996, p. 78). In this meeting, the teams used a whiteboard as shared drawing area.

In order to correctly understand and interpret the instance described below, we describe in this paragraph briefly a part of the team's feedback session after their second meeting. This feedback session was the only one that the lecturer attended in addition to the teaching assistant. For all other feedback sessions only one or both teaching assistants discussed the meeting result with the team. In the first part of the feedback session, the team explains their solution. M4 explains mostly the advanced hotel-booking feature of their service while M2 explains the additional features regarding orientation in an unknown environment and suggestions for spare time activities. Based on a statement by M4, the lecturer then challenged the team's proposed solution (i.e., "If navigation is not the big issue, then what is the big issue? He gets on a taxi. What kind of information can a Trip Assistant provide?"). Building on some of the team's ideas (e.g., navigation to points of interests and the suggestion of spare time activities) the lecturer proposes several ideas, including features for spending the available free time in a meaningful way and providing all basic information on one screen. The lecturer focuses his feedback especially on the service's part regarding suggestions of free time activities and elaborates on his previous idea of spending free time in a meaningful way. Thereby, he proposes two additional ideas based on personal experiences (i.e., compile a short and concise sightseeing tour and make recommendations for free time activities adjusted to the culture of the foreign city). The team listened to the lecturer's ideas and M2 took briefly notes. M4 was seemingly not pleased with the lecturer's ideas because he still argued for the value and demand of their hotel booking feature. In addition, M4 was in previous meetings not particularly amenable to M2's suggested features regarding the inclusion of navigation and public transportation.

This section provides a brief description of what happened in the meeting (see also the respective transcript extract in Table 20). During the third meeting, the team first briefly discussed what their overall application should look like and which features they want to include. They discussed the necessary functionality of their application based on the user stories, which they created in their 4th assignment (see section 5.4.5.2 for a description of the assignment). Finally, the team decided to create an initial mockup with for distinct functions: hotel, surrounding, entertainment, and settings. Each of the team members took over one part and the team sketched the respective screens simultaneously on the whiteboard. During this activity, M4 asked whether they should also create a screen for the "plan me a round trip" feature that provides the business traveler with a concise short sightseeing tour. This feature was one of the ideas, which were suggested by the lecturer during the discussion with the

team after the previous meeting. M2 offered to create one screen for this in her entertainment part. M3 asked whether they also plan to implement this feature. M2 negated this by saying that they do not have to implement it but it should be in one of the screens. Later on, M2 suggests also integrating a summary function for the hotel booking part. This was also an idea suggested by the lecturer. M3 includes this idea in the hotel part of the prototype. Towards the end of the collaborative prototyping meeting M2 mentions that in the part, which she had sketched, are all the features that nobody needs (i.e., she says "here is all the stuff that doesn't matter" and points at her mockups for the entertainment part).

Table 20. Idea from the Lecturer: filtering options in enjoy mode (Transcript extract: meeting task 3; team TripAssistant)

[NOTE: M2 is sketching the mockup for the main screen in the middel of the whiteboard]

M2: actually I would suggest that you guys do something like as well. (0:17:02.4)

M4: Yeah.

M3: Yeah.

M2: So like everyone skeches a part of something. Maybe what do you prefer to draw?

M4: I'll draw the map.

M2: For the hotel part we already have the mockups.

M4: I will draw the map. The navigation map.

M2: OK.

M4: Surroundings part. (0:17:16.7)

M2: OK, then you are for surroundings and for each we have a color. For example, hotel is blue so who draws hotel uses this kind and surroundings is green.

M4: Yeah that's a good idea.

M1: Yeah.

M4: Then I will need the green color. (0:17:32.4) [NOTE: M2 hand the green colored pen to M4]

M1: I want to draw the settings part.

M2: Then you use black. Settings is black and I will put the [NOTE: draws something into the main screen mockup]

(0:17:45.4) [NOTE: M3 starts to draw the screen mockups for the hotel part and M4 starts to draw the screen mockups for the surroundings part]

[…]

(0:18:19.0) [NOTE: M1 starts to draw the screen mockups for the settings part]

[…]

(0:20:26.1) [NOTE: M2 starts to draw the screen mockups for the entertainment part]

[…]

M2: And navigation will be everywhere so we just put a black one (0:20:32.4)

M4: Yeah.

M2: All something like this that connects everything. But how we do with augmented reality? We need to implement augmented reality like some

M3: This is the navigation thing where we put the layer over it and show how many minutes he has to go (...) or something like this.

M2: mhm. OK (0:20:57.5)

[…]

M2: Maybe we also have that function that you can uhm you can print out a list of the hotel and its surrounding information. Would you- (0:38:21.9)

M3: Print out? You mean really a print out? (0:38:25.6)

M2: Like you have a view. No no. I mean that you have a PDF view of the hotel information and also the surrounding information. Mayby put it in between. Draw a mockup in between. Just like with those lines as- since we have the time left. (0:38:42.9)

M3: Yeah. Uhm. So you mean uhm the surroundings of the hotel?

M2: Yeah. Yes. First like name of the hotel. Just say like something IBIS or something and then like distance to meeting location. How much and then near by facilities and uhm something like that and just use the uhm a summary that you get after you booked a hotel.

M3: Mhm. Yeah. Maybe then it's still here [NOTE: points at one of his screen mockups for hotel booking] somewhere. But where do you call it then?

M2: Because it's kind of connected with the surroundings. (0:39:26.1)

M3: Yeah, yeah. But where do you push to see it.

M2: After you booked the hotel. (0:39:31.9)

M3: Yeah but (0:39:33.2)

[…]

M4: Uhm. Do we still plan to implement or to offer this uhm "plan me a round-trip" within my free time? You know what I'm talking about? (0:40:28.8) [NOTE: M3 nods in agreement]

M2: Ah trip- free- I will put one in here. (0:40:32.3) Import schedule [NOTE: proceeds sketching her own idea]

M4: Well were already the arrows are on the map.

M3: Do we plan or do we not plan it? (0:40:46.4)

M2: I will put one. I mean we don't need to implement it but it should be at one of the screen. (0:40:52.4) Send your [NOTE: proceeds sketching her previous idea of importing a schedule]

M3: I don't know if we have to implement it. [NOTE: laughs briefly] (0:40:57.6)

M4: No if he wants (0:41:02.0)

M2: Send your preferences [NOTE: engaged in sketching and only talking out loud what she currently sketches]

M4: If he wants to have a suggestion he does not necessarily need to use it but- (0:41:14.6)

M2: This is like get suggestion [NOTE: points at a part of her mockup] (0:41:17.8)

M2: I will put like round-trip suggestion or something. Because here I have cultural events from 16 to 18 (0:41:28.1)

M3: Yeah, yeah. (0:41:28.9)

M2: and I will put a round-trip also. (0:41:30.5)

M3: mhm. But were do we, the summarize idea is good, but where do we call this summarizing thing? (0:41:38.2)

[…]

M2: This one is actually initial but after booked or logged in with booked yeah he sees the summary.

M3: He sees the summary. That's good yeah. (0:43:27.7)

M2: I'm sorry I didn't want-

M3: No problem, no problem. Uhm but it's a mixture of surroundings and

M2: Actually here is kind of all the stuff that does not matter. Oh I just included

M4: What I guessed was that theses two are uhm from the user interface are rather similar [NOTE: pointing at the entertainment and surroundings part] just form the pont of the content they are different. You know what I mean?

M2: Yeah. But this (...) just should be there [NOTE: pointing at the entertainment part]

M4: I mean this is actually very similar to this already so no problem here but (0:44:07.9)

Overall, the focus of the team during this meeting seems to be on creating something to please the teaching team rather than engaging in collaborative design activities in order to gain a deeper understanding about their proposed solution. The ideas from the lecturer were seemingly only included because they were proposed by a higher status person.

6.4.2.2 Influence of Opinion Leaders within the Teams on Idea Inclusion

We noticed during our analysis and coding of the meetings that for some reasons the opinion of certain team members counted more compared to others with regard to decisions about the inclusion of ideas. Even though we can only speculate about the underlying reasons why theses team members have a higher decision-making power and therefore a higher influence on the team's decision whether an idea is included or not, we observed this happening in our study. Based on the behavior of the other members of the team in relation to theses team members we hypothesized that theses opinion leaders occupy a higher status within the team. Therefore, we include the related examples in this section.

We identified A3, M2 and T4 as the opinion leaders in their respective teams. That does not mean that solely these three team members made decisions but rather that theses individuals had more influence on the outcome of verbal dispute than others. The high status of theses individuals is not based on hierarchy or unilateral dependence as in the example of the outside high status person above. We would rather attribute their high status to personal characteristics and their behavior as distinguishing factors between A3, M2 and T4 and their teammates. Yet, based on the available data and with respect to the focus of this study, we cannot say which factors are decisive for this circumstance. For example, A2 (A2B) shares lots of qualities with the opinion leaders M2 (TripAssistant) and T4 (Tripster) in terms of creativity, drive for shaping the final design and communicativeness. Yet his decision-making

power in his team is lower compared to that of A3, whose qualities are rather different compared to M2 and T4. This is observable at least in the first three meetings. In the fourth and fifth meeting, A2 is gaining more influence. Based on the observed behaviors of the opinion leaders we would assume that an individual's level of confidence is at least one of the decisive influence factors. In addition, good communicative abilities and a persuasive rhetoric might also play a critical role (e.g., M2 is not only confident about her opinion but also able to vividly explain it and illustrate it with analogies).

In this paragraph we describe briefly an example that shows M2's high status in team TripAssistant. Already during the first team meeting M2 had a great influence on the team's course of action as well as on the content of the team's solution. For example, after all team members have read the instructions for the creation of a one-sentence pitch, M4 questions the necessity of using the provided one-sentence pitch template (M4: "First of all the question: should we stick to this template or should we try to come up with our own template?"). M3 seems to feel obligated to use the provided template and therefore disagrees with M4 (M3: "I think we have to use this."). It has to be noted that M3 and M4 are friends and it seems that M3 usually values M4's opinion (e.g., when M3 asks a question he addressed it in the first two meetings mostly at M4 and looked at his reaction). M2 also thinks that they should use the provided template (M2: "But why do they-? Let's go through each of their items. So if we think of another template we still need to put all the items in."). Subsequently, the team discusses whether to use the provided template or to come up with another one. M2 argues in favor of using the provided template or at least address all its five points. M4 prefers to structure the sentence differently. Finally, M4 gives in and the team follows M2's suggested course of action. Overall, we would suggest that her higher level of confidence and her superior communicative skills set her as the team's opinion leader. Even though M2 joined the team not until the first idea presentation she quickly became a central part of the team. Based on the other team member's behavior, we would suggest that M4 was the team's opinion leader before M2 joined the team. In addition, we have to note that over the course of the project also M4 has a good share in the decision-making especially with respect to decisions in the context of software development.

In this paragraph we describe briefly an example that shows A3's high status in team A2B. A3 is in contrast to M2 less communicative. Yet his teammates still respect his opinion. In the case of A2, he respects A3's opinion even if he obviously disagrees with him. For example, towards the end of the third meeting, A2 mentioned his idea regarding the inclusion of a notification feature for the second time (A2: "Because it would be cool if the app says, okay, now you have to start moving in order to arrive at your appointment in time."). Even though A1 shows again consent (A1: "Yes, we can integrate one or two of these cases.") the idea is not included. A3 ignores A2's idea seemingly for the second time. Yet, this time he reminds his teammates of the approaching deadline and urges them to hurry up (A3: "We have to hurry up."). A2 starts another attempt and tries to integrate A3 in his discussion with A1 (A2: "OK. So, what's your suggestion?"). A3 makes a brief suggestion for a possible solution and then refers back to the limited available time without further consideration of A2's idea (A3: "You don't need this. I would just say here, for example, [...]. And that's it. [...] We also have not so much time left."). Whereas M2 used her communication skills and tried to convince her teammates with arguments, A3 ignores ideas that he does not like. In addition, he created a sense of time pressure and urged his teammates to finish.

Overall, our observations suggest that in each team there is at least one team member enjoying a higher status, and therefore, exercising more influence on idea inclusion. As noted above, the high status of these team members is not based on hierarchy or other factors outside the team. Based on our observation, we would suggest that the higher status of individual team members and their resulting role of the opinion leader are based on a combination of multiple factors in the context of the team members' personalities and behaviors. We also noticed that the role is not predetermined and it can also change. For example, in team A2B, A2's decision-making power increased over the course of the project due to observable changes in his behavior, including an increased assertiveness in addition to the application of more aggressive strategies in his attempts to include his ideas into the team's result.

6.4.3 Disconfirming Incident

This chapter provides contradicting evidence for our hypothesis that the high status of a person facilitates the inclusion of his or her ideas. In the following sections, we describe an exemplary incident in which an idea was not included in the team's outcome, although a high status team member proposed it.

6.4.3.1 Divergent Thinking versus Need for Closure or rather the Superior Decision Making Power of Time

The instance described in the following sections occurred during team TripAssistant's work on solving the first task (see section 5.4.5.4 for a description of the meeting task and the template provided for the one-sentence pitch). The team was working on the formulation of a concise description of their proposed solution. The goal of this task was the creation of a short statement that describes the team's product in terms of its target audience, the solved problem and their unique selling proposition. The one-sentence pitch should help people outside the team to quickly understand the main aspects of the team's proposed product. Within the team, the one-sentence pitch functions as a kind of mission statement (cf. Ulrich & Eppinger, 2008, p. 13) as it describes the team's joint goal in an abstract way. Therefore, the created statement can have a far-reaching influence on the team's next steps and the design of the final product.

This section provides a brief description of what happened in the meeting (see Table 21 for the transcript extract of the respective incident). The team is working on the specification of the item "defined audience" of their one-sentence pitch. So far, the team used the general term "business traveler" to describe their defined audience. M2, who is assumed to have a higher status due to her frequently observed role as the team's opinion leader, suggests that they should use a more specific statement to describe their target audience. By pointing on something on her laptop's screen she seems to refer to the description of their target group, which was presented by the team in their first idea presentation. M3 looks at the respective statement and agrees. Even though M1 attempted previously to enlarge the defined audience by including other customer groups in addition to business traveler, she signals now consent to M2's suggestion regarding further narrowing down their customer group. M2 proceeds and proposes the idea of describing their defined audience as "business travelers using public transportation". As no one reacts to her suggestion, M2 tries to integrate more information from the presentation to make the description of the defined audience even more specific. She

suggests, “Business travelers traveling to unknown locations using public transportation”. Her second suggestion immediately receives dismissive feedback from M1, who thinks it is too long, and M3, who finds the statement misleading. Even though M3 does not like M2’s latter suggestions he supports M2 in her attempt to create an apt description of the defined audience. After about one minute, M4 speaks up and insists that the group should stick with the general term “business travelers” for the time being and that they should continue with the next item in the one-sentence pitch template. M4's statement can be interpreted as follows: let us not do this now because it is too hard. M1 agrees with M4 and also M3 reluctantly agrees. M2 is quiet for a few seconds and then starts with the discussion of the next item.

Table 21. Idea of M2: business traveler using public transportation (Transcript extract: meeting task 1; team TripAssistant)

M2: To help business traveler. I would even specify business traveler because we have this in our [NOTE: M2 is pointing on a presentation slide on her laptop] (0:09:55.5)

M3: Yeah. (0:09:55.9)

M1: OK (0:09:56.5)

M2: We can say business travelers using public transportation. Frequently traveler. How we bring this in one sentence? Business travelers traveling to unknown locations using public transportation. (0:10:29.9)

M1: It's long. (0:10:31.0)

M3: Yeah. It also sounds to me like that they travel to the location with public transportation (0:10:38.8)

M1: I think we don't need to offer … [NOTE: M1 got interrupted by M2]

M2: Business traveler in unfamiliar locations? (0:10:48.2)

M1: I don't think that we need to provide so much detail in the one sentence. We only need to … I think business travelers is enough. (0:10:57.3)

M2: I don't think so. Business traveler is too large of a customer group. (0:11:03.3)

M3: Yeah. Maybe we can leave out this here [NOTE: M3 is pointing on a statement in the presentation slides on M2’s laptop] and just … [NOTE: M3 got interrupted by M4] (0:11:10.3)

M4: OK, so I would suggest that we just stick to business travelers and think of a better term-um at the end. So that we really have the template completely filled in with some terms to first of all have one solution. Maybe it can be done better but we will refine it if there is some time left. Maybe we can also use the last five minutes that we gave ourselves. (0:11:47.1)

[NOTE: Both M1 and M3 agree verbally and nonverbally to M4's suggestion. M2 keeps silent and shows no obvious signs of non-verbal consent]

M3: So. (0:11:48.7)

M2: What is our problem solving here? (0:11:53.1)

In the instance described above, M4 rejects M2's ideas of a more specific description of their target audience. He suggests sticking with what they have right now without discussing it further and eventually solving the issues with the current item but rather proceeding with the next item in order to fill in the whole template within the time frame of the meeting. Therefore, his goal seems to be to finish the entire task in time even if the created partial solutions are not the best solutions. M2, on the other hand, seems to enjoy the creative challenge of creating an apt description of their defined audience. Therefore, M2 came up with a set of ideas because she has the perception (or rather the goal) that the team's task is to generate a creative solutions and M4 rejected her ideas because he was concerned with getting it done in the specified time. M4's statements also indicate a need for closure (cf. Chirumbolo et al., 2004; Kruglanski & Webster, 1996) because his primary objective is to "[…] first of all have one solution […]" without caring too much about the quality of this solution. A need for cognitive closure is defined as an "[…] individuals' desire for a firm answer to a question and an aversion toward ambiguity" (Kruglanski & Webster, 1996, p. 264). As a situation-depended state, a need for closure can be caused by feelings of time pressure or boredom and appears as a temporally limited desire of an individual for finding a quick answer to a question (Chirumbolo et al., 2004, p. 265). Based on M4's statements, we assume therefore that a feeling of time pressure causes his need for closure. For example, he notes that the team can "[…] refine it if there is some time left". Findings from laboratory experiments suggest that a need for closure impedes a group's creativity as it reduces the amount of creative acts in the group discussion for the benefit of task-oriented acts (Chirumbolo et al., 2004, p. 275). This phenomenon becomes also apparent in the incident described above. M2's creative flux ended abruptly with M4's suggestion to stick with the general term "business traveler" and proceed with the completion of the task.

Overall, one person pursued the goal of fulfilling the requirements of the task and the other saw it as something exciting and fun and pursued the goal of solving an interesting problem, explore alternative solutions and develop potentially a superior solution. With no further attempts to include M2's idea, the team proceeded with the task and the idea was excluded for now. Therefore, M2's higher status and the resulting higher influence on idea inclusion was countered by M4's reference to the limited time available for solving the task. We noticed the critical influence of time on decisions regarding idea inclusion at several instances throughout the all three projects.

6.4.4 Discussion

An alternative explanation for the observed effect that ideas of a higher status person are likely to be included in a team's design could be that these ideas were also more creative. The

generation of creative ideas requires among other things a diverse knowledge base (Glăveanu, 2013, p. 76; Paulus et al., 2012, p. 336) and as persons of a higher status might also have gained experience across various domains they might therefore be able to draw from a rich knowledge base. Consequently, not the high status of the person but rather the creativity of his or her ideas may have boosted their inclusion in the teams' outcomes.

We did not rate the creativity of the individual ideas, which were proposed by a team member. Thus, we cannot make any statements whether the ideas suggested by a high status person were also more creative and therefore seized by the teams. However, research findings suggest that "[..] people hold an implicit bias against creativity […]" (Mueller et al., 2012, p. 16). That is, more practical and unoriginal ideas are preferred over creative ideas (Mueller et al., 2012, p. 17) because of people's tendency to reduce uncertainty (Lane & Maxfield, 2005, p. 10; Mueller et al., 2012, p. 16). Therefore, we would assume that even if the included ideas comprised a high level of creativity they were not included because of it but rather in spite of it. Consequently, the high status of the idea provider seems to be the more plausible explanation for the inclusion of his or her ideas.

Furthermore, at some point in time during the multistage process of innovation innovators need to seek support from others for their ideas and solutions (Scott & Bruce, 1994, p. 582). In this respect, Kanter (1988, p. 185) conceptualizes coalition building as one of the major tasks in innovation. She further states that effective social and political activities of an innovation team are at least as important if not even more important than the quality of the innovation idea in determining the innovation's fate (Kanter, 1988, p. 185). Therefore, in a new product development project having the support of a higher status person may turn out as beneficial to the project team. Even though there are mixed findings regarding the effect of top management support with respect to an innovation project's success (van der Panne, van der Beers, & Kleinknecht, 2003, p. 321), the support of a supervisor is shown to positively influence subordinate's creativity (Shalley & Gilson, 2004, p. 40f). In addition, people may favor solutions that incorporate their own ideas because of the mutual influence of a person's choices and his or her preferences (Sharot, Velasquez, & Dolan, 2010, p. 1231). Consequently, when a team includes at least some of their supervisor's ideas it can have beneficial consequences for the team with regard to the supervisor's evaluation of their result. This assumption could also explain why teams incorporate ideas of higher status persons into their solution.

In addition to the above-mentioned effect on idea inclusion based on the higher status of an idea originator outside the team, we found that also within each team one team member exercised a greater decision-making power compared to his or her teammates. This is not uncommon. For example, Pruitt (1971) argued that one theoretical explanation for choice shift (i.e., a group-induced shift of an individual's choice of options in a group setting) in group discussions is based on leadership theory. Summing up various leadership theories Pruitt (1971, p. 344) states that the influence of an opinion leader might be provoked by the person's high level of confidence or the persuasiveness of his or her rhetoric. That is, a person who is either very confident regarding a decision or provides very persuasive arguments exercises more influence on idea inclusion than more insecure or less persuasive team members.

More recent research results suggest that especially a person's level of confidence affects his or her influence on team decisions. For example, Howell (2005) attributes the behavior of "[…] conveying confidence and enthusiasm about the innovation […]" (Howell, 2005, p. 108) as a critical attribute of champions. In the context of innovation chanpions are "[…] individuals who informally emerge to promote the idea with conviction, persistence, and energy, and willingly risk their position and reputation to ensure the innovation's success" (Howell, 2005, p. 108). Radzevick and Moore's (2011, p. 93) research on the effect of market competition among advisors on the expression of their overconfidence suggests also a crucial influence of confidence on judgment due to the fact that overconfidence helped advisors to sell their advice. In our study, we noticed also that the highly confident team members exercised a greater decision-making power compared to their less confident teammates. Yet, in accordance with Pruitt (1971) "[…] there is evidence suggesting that two or more mechanisms may be at work in group discussions and hence that more than one of the theories may be correct" (Pruitt, 1971, p. 339). That is, a team member's level of confidence might only be one of several factors that influence his or her decision-making power in the team.

In addition, a study by Aime et al. (2014) investigated the effect of power structures in cross-functional teams. They found that leadership structures, in which the decision-making power shifts between the members of a team in alignment with situational demands and the members' skills and knowledge, are beneficial with respect to team creativity if the team perceives the shifts in the power structure as legitimate (Aime et al., 2014, p. 327). Their findings could be used to explain, for example, why in team TripAssistant decisions with regard to the implementation were made by M4 and sometimes even M3 (both study computer science and are skilled programmers) whereas decisions regarding the overall offering of the mobile service and the business model were mostly made by M2, who has, based on her study of information systems, seemingly a good overall understanding with regard to the application of information and communication technology to solve a users problems. In team A2B a shift in power was seemingly not tolerated by A3, and therefore, A2 had to struggle for a long time with the inclusion of his ideas. In team Tripster the majority of the team members had a computer science background and therefore they concentrated predominately on issues with regard to the feasibility and usability of the application and let almost alone the business aspect of their mobile service. In addition, regarding M1 (TripAssistant) and T1 (Tripster) influence in their respective teams, we would argue that not a lack of situation-relevant skills and knowledge (cf. Aime et al., 2014) but rather a lack of confidence (cf. Radzevick & Moore, 2011) weakened their decision-making power within their teams.

Overall, we found that, irrespective of the actual reasons underlying the influence of a high status person within or outside of the team, the fact that an idea is proposed by or based on the suggestion of a high status person promotes the inclusion of this idea.

6.5 Control of Media: The Pen is Mightier than the Voice

Our fourth hypothesis is concerned with the effect of a team member's chances to write down an idea in relation to the inclusion of this idea in the team's outcome. While the individual team members had almost always the possibility make verbal contributions to the final

outcome of the team meetings, the chances to create a part of the written or drawn outcome varied. For example, the requested outcome for the first meeting task was a one-sentence pitch. The meeting room was equipped with a whiteboard and two cork bulletin boards. In addition, some teams used partially a laptop or a tablet computer to access previously created results or look-up additional information. However, all three teams decided to write down their partial solutions as well as their final solution on a sheet of paper. This limits the chances for the team members to create an actual part of the final outcome because usually only one team member writes down the solution and he or she is then in control over the team's result. Although the observed teams used paper-based tools to create their results, similar effects may also occur when using digital tools. For example, when a meeting room is equipped with a single big display (e.g., a large monitor or video projector) for jointly viewing the screen content of a connected computer, then only the team member, who operates the computer, is actually able to manipulate the content. Based on our experience, this scenario is quite common for team meetings in the automobile industry. Thus, the observed effects are less a result of the applied tools than of the common behaviors of members of a team in meetings.

6.5.1 Hypothesis

The team member who controls the media that contains the final design has also the possibility to dictate the content of the final design. Thus, who has control of the media affects whose ideas are included and whose not. Our fourth hypothesis is therefore:

> *H4: Having control of the media that contains the final design leads to inclusion of own ideas.*

Contributions are often made verbally in team meetings and individual team members might then argue about the inclusion or exclusion of the suggested ideas. However, the spoken word is volatile, and thus, in the end what matters are the things that were written down during the meeting. After the meeting, not the verbal discussion but the created result, i.e., the written or drawn artifact, is communicated to the stakeholder like managers or customers. Therefore, the one who is in charge of the creation of the result has therefore also the greatest influence on the content of the result.

Control of the media facilitates especially the inclusion of team member's own ideas. However, in settings in which the team works collaboratively on the creation of a joint result, the person in control of the media also acts as a filter for the inclusion of ideas that are verbally expressed by his or her teammates. Thus, this person acts as a kind of gatekeeper in relation to the design of the team's proposed solution. In innovation research, a gatekeeper is usually someone who decides "[…] whether or not (and to what extent) to share information from the environment with others" (Reid & de Brentani, 2004, p. 174). That is, a gatekeeper acts as a filter for information from outside a group. In our study, however, we noticed that the team member who controls the media also acts as a kind of gatekeeper, but in this case he or she controls the information flow in the other direction. That is, he or she acts as a filter for the uttered information provided by his or her teammates. Therefore, the person, who acts as a gatekeeper with respect to the selection of information to include in the team's design, also

influences to a great extent the kind and amount of information available to people outside the team (e.g., the project manager).

6.5.2 Confirming Incidents

This section provides support for our hypothesis that the control of the media, which contains the final design, leads to idea inclusion. We found that gaining control over the media that contains the final design is used in particular to incorporate own ideas in the proposed solution of the team.

In the following sections, we describe incidents in which having control of the media leads to the inclusion of ideas.

6.5.2.1 Idea Inclusion due to Control of Media: Writing the Final Solution

The instance described in this section occurred during team TripAssistant's work on solving the first task (see chapter 5.4.5.4 for a description of the meeting task and the template provided for the one-sentence pitch). The team is working on the formulation of a concise description of their proposed solution. The goal of this task is the creation of a short statement that describes the team's product in terms of its target audience, the solved problem and their unique selling proposition.

This section provides a brief description of what happened in the meeting (see also the respective transcript extract in Table 22). During the creation of the one-sentence pitch in the first meeting, M2 wanted to make the description of the defined audience more specific. She suggested narrowing down the relatively large user group of all business travelers to those using public transportation for traveling around at the location of their business trip. M4 rejected the idea and suggested to stick with the term business traveler for now. Towards the end of the meeting, M2 took the opportunity: she asked M1 to hand her an empty sheet of paper and wrote down the team's final solution. Thereby, she included her previously suggested idea (i.e., "business traveler using public transportation") in agreement with M3, who was previously also not averse to this idea. Both M1 and M4, who were previously rather dismissive with regard to this idea, were at this time concerned with finding the best wording for another part of the one-sentence pitch. In addition to her gaining control over the media that contains the final result, M2 mentions that they are short in time and suggested to just use what they already have. Her statement might have elicited a feeling of time pressure in the team. Especially M4 was previously concerned about the limited time. Yet, is has to be mentioned that M2, although she was in control of the final result, tried to get the team's consent before she included her partial solutions in the final result.

Table 22. Idea of M2: business traveler using public transportation (Transcript extract: meeting task 1; team TripAssistant)

M1: So the sentence should be to help the business traveler (0:23:13.1)
M4: uhm (0:23:14.2)

M2: in an unknown environment (0:23:16.3)

M4: yeah but then maybe we can uhm

M1: to find a suitable hotel in an unknown environment

M4: uhm say to. Not just help. Helping

M2: helping (0:23:26.5)

M4: with what? With orientation or

M3: Yeah (0:23:29.7)

M2: Yeah

M4: somehow to

M2: help the businss

M4: not only have the the this help standing alone (0:23:36.5)

M2: also what, help business travelers orient in an unknown environment (0:23:44.3)

M3: Yeah. (0:23:45.2) [NOTE: looks at M4]

M2: Can you give me a paper then I write down in the paper [NOTE: directed to M1] (0:23:47.9)

M1: mhm (0:23:48.4) [NOTE: hands M2 an empty sheet of paper]

M2: And since we are [NOTE: looks at her wristwatch] I see we don't have a lot time left let's just stick to the (0:23:55.5) [NOTE: parallel to her utterance, M2 has already begun writing down the team's final solution]

M3: oh yeah we only have [NOTE: looks at his smartphone] seven minutes left (0:23:58.5)

M2: uhm what's the name? Marshmallow (0:24:03.5)

[...] [NOTE: Team briefly discusses the company name]

M2: My company is [NOTE: speaks loudly of what she is writing] (0:24:24.8)

M1: That's our company (0:24:26.8)

M2: Yeah. Our company. (0:24:32.1) [NOTE: gets an eraser to change what she has written]

M3: Yeah, what's what's a better word for orientation stuff in the [NOTE: addressed to M4]

M2: Here [NOTE: points at her open laptop on the table] use the internet (0:24:42.3)

[...] [NOTE: M1, M3 and M4 look up a better term for orientation on a laptop]

M2: Is developing a mobile application [NOTE: speaks loudly of what she is writing] (0:24:56.9)

[NOTE: M1 stands up and bends over the table to have a better view on the laptop screen; M3 is operating the laptop; M4 also looks at the laptop screen]

[...] [NOTE: M1, M3 and M4 look up a better term for orientation on a laptop]

M2: but business travelers uhm business traveler fre- frequent business travelers (0:25:13.0) [NOTE: addressed to M3]

[NOTE: while M2 talks M1 stands up and goes around the table to M4. M4 has gained control over the laptop. M3 nods his head in a way that kind of says 'yeah that could work, but']

M2: or business travelers using public transportation (0:25:16.5)

M3: yeah (0:25:17.5)

[NOTE: M2 continues writing; M4 is looking up a better word for 'orientation' on the laptop and M1 is standing next to him looking what he does; M3 is sitting upright and also looks at the laptop screen; M3 smiles and bends forwards]

Writing the final solution gave M2 complete control over the content and wording of the team's one-sentence pitch. However, an additional factor that may have helped her regarding the integration of her idea in the final design was the team's feeling of time pressure. The teams had only 30 minutes for the creation of their one-sentence pitch. Although the teams prepared relevant information in advance to this meeting, we noticed that the rather short duration of this meeting caused time pressure among the members of this team. For example, when M2 asks M1 for a sheet of paper to write down the final solution M2 mentions that they do not have much time left. In addition, especially M4 cared about finishing the task in time and pushed the team to proceed with their work in order to have at least a complete version of the one-sentence pitch even if it might not be the best possible version. Thus, in this case the occurrence of several factors helped M2 with the inclusion of her idea.

6.5.2.2 Idea Inclusion due to Control of Media: Sketched by the Gatekeeper

The instance described in this section occurred during team Tripster's work on solving the third task (see chapter 5.4.5.4 for a detailed description of the third meeting's task). In the third meeting, the teams were asked to collaboratively create a low-fidelity prototype of their mobile application in form of simple screen mockups. The created prototype should show the mobile application's key features based on the respective screen mockups as well as a general flow through the individual screens of the application (cf. Rudd et al., 1996, p. 78). It is critical that the team achieves a shared understanding about the features of their mobile application because other parts of their entire proposed solution depend on these features (e.g., the possible kinds of revenue streams). Therefore, the team worked on a whiteboard as shared drawing area for the design of the screen mockups (Schrage, 1990, p. 98).

This section provides a brief description of what happened in the meeting (see also the respective transcript extract in Table 23). The team started with a discussion about the content and functionality of the application's first screen. All team members had a different idea for the first screen. T1 proposed his idea first and received unanimous disagreement from his teammates. T1's idea is based on the argument what most other mobile applications, which provide augmented reality features, use as their first screen. Next, T3 proposes his idea of providing the possibility to put in ticket information at the start screen. Without discussing T3's idea, T2 states his counterproposal and explains his reasons for refusing T1's idea. T4 does not seem to be convinced of T2's idea and shows dissent. Yet, T3, who has currently a pen and has already drawn a rectangle as frame for the first screen on the whiteboard, agrees with T2 and sketches his idea according to T2's brief description of how it should look like. When T3 is finished with sketching the screen mockup he asks whether it meets T2's idea. T2 agrees. Even though the start screen mockup is further elaborated over the course of the meeting, its basic functionality and layout remains the same and was only refined and enhanced.

Table 23. Idea of T2 sketched by T3: start screen shows list of planned trips (Transcript extract: meeting task 3; team Tripster)

T4: So what would the basic. Like uhm (0:04:49.2)
[NOTE: T3 draws a rectangle as frame for the first screen. T1 proposed the idea to have the augmented reality view right at the beginning, i.e., as kind of a start screen; unanimous disagreement from T1's teammates. T2, T3, T4 are all against T1's idea, yet they all have different counterproposals. T3 suggests providing the possibility to put in ticket information at the start screen. T2 makes a counterproposal that includes also parts of T3's idea. T2 shows the strongest dissent with T1's proposed idea and provides also a rationale for his dissent]
T2: I think that at the beginning should be the list of your trips that are already inside so this is, you know, my trips [NOTE: pointing action] (0:05:17.2)
T3: Yeah, OK
T2: the list of them, and add button. (0:05:19.4)

T3: Yeah, OK (0:05:20.7) [NOTE: sketches T2's idea]

T2: and because, I don't know,

T4: No, I don't-

T2: anyone should be first,

T4: No. (0:05:24.3)

T2: but this is the main point of issue with the augmented reality applications. That you. If you. All the time turn around to use this applications you have to put your cellphone like this. And this is not comfortable. (0:05:35.2)

T1: OK (0:05:35.6)

T2: So this is only the. Some addition later. (0:05:38.0)

T3: So something like this? [NOTE: looking at his skech of T2's suggestion] (0:05:39.7)

T2: Yeah! I think that something like this should be the first point. (0:05:43.0)

T3: Anything else on the first? [NOTE: looks at his skech of the first screen] (0:05:45.2)

[NOTE: T2 further elaborates his idea verbally by suggesting that the start screen could always show relevant screen based on GPS information. At first T4 dismisses this idea but then builds on it and the idea is refined and further elaborated during the subsequent discussions in the team. Even though the first screen is further elaborated over the course of the meeting, its basic functionality and layout kept the same and was only refined and enhanced]

Over the course of this meeting, the members of team Tripster show most of the time a healthy collaborative behavior (i.e., a mix of challenging and supporting their teammates' ideas). This becomes also obvious in the example described above. T2 refuses T1's idea for a good reason and explains his point of view. In addition, T2's suggested inclusion of an add button incorporates in its broadest sense also T3's idea regarding the possibility for entering ticket information. Even though T3's idea does not end up to be the start screen, it is included later on as an additional screen that is called via the add button at the start screen. Moreover, this incident shows that controlling the media does not have to be for a selfish reason with regard to the inclusion of an own idea. T3 sketches the start screen on behalf of T2 and reassures that he understood and sketched the idea correctly. In this way, T2 had time to explain his point of view while T3 could contribute to the final result by shaping the appearance of the start screen.

6.5.3 Disconfirming Incident

This section provides contradicting evidence for our hypothesis that having control of the media that contains the final design leads to idea inclusion. In the following sections, we describe an exemplary incident in which an idea was not included in the team's outcome, although the originator of the idea had at least temporarily control of the media that contains the team's outcome.

6.5.3.1 The Eraser is Mightier than the Pen

The instance described in this section occurred during team A2B's work on solving the third task (see chapter 5.4.5.4 for a detailed description of the third meeting's task). In the third meeting, the teams were asked to collaboratively create a low-fidelity prototype of their mobile application in form of simple screen mockups. The created prototype should show the mobile application's key features based on the respective screen mockups as well as a general flow through the individual screens of the application (cf. Rudd et al., 1996, p. 78). It is critical that the team achieves a shared understanding about the features of their mobile application because other parts of their entire proposed solution depend on these features (e.g., the possible kinds of revenue streams). Therefore, the team worked on a whiteboard as shared drawing area for the design of the screen mockups (Schrage, 1990, p. 98).

This section provides a brief description of what happened in the meeting (see also the respective transcript extract in Table 24). A1 notices that about two thirds of the meeting are over and that the time is passing by rather quickly. Then, A1 asks his teammates what additional features they should address in the remaining time of the meeting. He mentions one of A2's previous ideas, i.e., the functionality of planning a trip in advance (i.e., planning ahead), and asks his teammates whether they should incorporate it or not. A2 still likes his idea and starts immediately sketching an additional screen for creating new appointments because he is of the opinion that the feature to plan ahead should be realized via the planning of appointments in the calendar. A3 shows dissent and remarks that this is already included in the "appointment" part of the start screen. A2 disagrees partly because the possibility to create new appointments is missing and proceeds with sketching the screen mockup. In addition to A3 also A1 objects and argues that the creation of a new appointment within their mobile application is not necessary because of the calendar synchronization feature. Therefore, new appointments can be created directly in the user's calendar application. Both A1 and A3 are not convinced by A2's newly suggested feature. Nevertheless, it is currently part of the solution because of the screen mockup that A2 has created. A3 suggests looking at the most important user stories, and thus, disrupts the current discussion about A2's interpretation of the planning ahead feature. After A2 and A3 discussed the most important user stories, A3 goes to the whiteboard and looks at A2's sketch for creating a new appointment. He includes parts of it into the team's start screen, which he had previously sketched. Even though A2 shows dissent with A3's interpretation of the respective feature, he does not assert his own point of view. After A3 has included the possibility to select a specific date and time for a trip in order to enable planning it in advance in addition to the instant route planning, A3 erases A2 previously created screen mockup, and thus, excludes A2's interpretation of the feature.

Table 24. Idea of A2: planning ahead
(Transcript extract: meeting task 3; team A2B)

A1: Uhm, was wir jetzt noch nicht haben, ist die Möglichkeit vielleicht im Vorhinein zu planen. (0:28:09.9)

A2: Genau.

A1: Dieses Dings gibts noch nicht. Dass man halt hier einfach fünf erschiedene Ziele am Stück angibt.

A2: genau das sollte ähnlich sein- (0:28:15.9)

A1: das hätten wir jetzt zum Beispiel noch nicht drin. Jetzt ist die Frage, wollen wir das jetzt noch machen? Oder wollen wir uns erst einmal für die spontane Art und Weise eben.

A2: Wir haben ja hier noch Platz für einen Screen [NOTE: starts drawing a screen mockup]

A1: Den können wir ja auch-

A3: Also das mit dem Planen-

A1: den können wir wegnehmen. Den können wir da lassen. (0:28:29.1) [NOTE: points at another sketch]

A3: Das mit dem Planen ist ja fast mit den Terminen eigentlich (0:28:31.8) [NOTE: points at the appointment section of the start screen mockup]

A2: Genau. Du synchronisierst es mit deinem Kalender, aber dass du halt eben auch, dass du quasi, wir synchronisieren einen Google Calendar mit unserem, mit einem lokalen Kalender bei uns am Server und du kannst den Kalender eben noch bearbeiten. Du kannst also von hier aus einen rein schieben der vielleicht noch zurück auf Google Maps geht aber warum muss ja nicht. (0:28:47.2)

[NOTE: A1 wants to say something but got interrupted by A2]

A2: Aber, dass du halt irgendwie, du sagst halt hier, ist Termin uhm (0:28:51.9) [NOTE: draws something]

A1: Aber von der Nutzung her, von der Nutzung her macht es eigentlich keinen Unterschied ob du deinen Termin in Google Kalender einträgst oder hier (0:28:57.0)

A2: Genau.

A1: Das macht eigentlich von der Nutzung her keinen Unterschied.

A2: Genau. (0:28:59.4) Die Frage ist nur ob wir es zurücksynchronisieren mit Google

Kalender? Das geht ja genauso.

A1: Ja das könnten wir so machen, ja

A2: Du hast halt deine Kalenderkopie, die bei uns drauf- uhm weißnicht hier ist dein appointment dringend, Besprechnung oder irgendsowas, da musst ja keinen krassen Titel reingeben, Adresse und ja Uhrzeit, Datum (0:29:20.3) [NOTE: sketches the screen parallel to his explanation]

A1: Ja

A2: Da kann man die ganzen Standardelemente, der Betriebssysteme nehmen, Datum, ganz normaler Aufruf, hast du eben auch bei Android. Und, wennst einen neuen Termin willst, Plus das Dind Plus fertig speichern.

A3: Ich glaube was wir jetzt noch schnell machen sollten das wären jetzt unsere wichtigsten 10 überhaupt raus suchen. Die vielleicht kurz markieren und kucken ob wir die jetzt irgendwie dargestellt haben. (0:29:48.6)

[NOTE: A3 goes to A2's laptop and looks at the user stories. A1 and A2 join A3. A2 and A3 are working on A2's laptop and discuss the list of the most important user stories. A1 stands in front of the whiteboard and looks at the mockups, which were mostly created by A3]

A2: what … na ist eigentlich schon cool die Buchung direkt aus der App heraus. Das ist auf jeden Fall ein Feature das wir brauche. Synchronize my calendar. Das sollten wir auf jeden Fall mit rein nehmen, weil das halt- weil das wirkich den Mehrwert den du halt dann hast als Assistent irgendwie positionieren kannst. Plan a trip upfront. Aber das ist jetzt auch schon- aber eigentlich ist das schon im Kalender schon drin. Preferences. Weather conditions. Weather conditions ist ein wichtiger Faktor, den wir eh schon hatten und den hier noch einer genannt hatte. (0:31:09.3)

[NOTE: A1 wanders around in the room. A2 and A3 still discuss and select the most important user stories]

[NOTE: A3 goes to the whiteboard and looks at A2's sketch} Also das hier kann ich noch hier mit dazu packen [NOTE: points at a part of A2's screen mockup and then at one of his own]

A3: Oder (0:32:55.4) [NOTE: sketches his idea regarding the integration of A2's idea into his previously created sketch for the start screen]

A3: und hier Datum Uhrzeit (0:32:57.1) [NOTE: proceeds sketching his conception of how A2's idea should be included]

A2: Ne, dann müsstest du das eigentlich bei Termin dazu quetschen (0:32:59.4) [NOTE: points at the respective part of the screen mockup] Weil das würde dann [NOTE: points at

A3's new addition to the mockup] eine via bedeuten (0:33:02.9)

[NOTE: A3 proceeds sketching the idea according to his point of view]

A1: Das ist jetzt die Frage (0:33:07.6)

A2: Ja eigentlich

A1: passt das da überhaupt rein? (0:33:10.0)

A2: Das du es halt direkt da raus hauen kannst, ja. (0:33:11.6)

A3: Ja. Musst ja kein extra Bildchen machen (0:33:14.2) [NOTE: grabs the whiteboard eraser] Datum und Uhrzeit ist halt, sag ich einmal, standardmäßig auf jetzt eingestellt (0:33:20.0)

A2: Ja ja (0:33:20.5)

A3: dann kannst du es halt verändern (0:33:21.4) [NOTE: erases A2's previous screen mockup for the feature of "planning ahead"]

A2: So wie jetzt, in einer halben Stunde, Stunde (0:33:23.7)

[NOTE: team proceeds with discussion about other screens and features]

The incident described above highlights the influence of the malleability of the media, which contains the final design, on idea inclusion. A design on a whiteboard is easily modifiable and also almost effortless erasable. Therefore, mainly the respect for another team member's sketch affects the permanence of a sketch on a whiteboard. A2 was quite eager sketching his idea. At first, it seemed that his temporary control over the whiteboard (i.e., the media that contains the team's final outcome) enabled A2 including his idea according to his point of view. Although A1 and A3 are seemingly not in favor of A2's idea, A3 switches the team's discussion to another topic and discusses the user stories with A1. A possible interpretation of A3's behavior could be that he may have attempted two things with his suggestion: (1) disrupt and eventually stop the discussion about A2's idea of the feature for creating a new appointment and (2) find additional arguments based on the user stories in order to dismiss A2's idea (e.g., when this feature is not addressed in one of the user stories). About five minutes after A2 had created the screen mockup of his idea A3 becomes more aggressive in his attempt to exclude it. A3 included parts of A2's idea in the start screen by drawing to rectangles for the user's input of date and time. Then he erases A2's recently sketched mockup from the whiteboard. That is, he, who has the eraser, wins regarding idea exclusion.

According to our interpretation, A3's act was a smart move because it almost seemed like he would actually integrate A2's idea of planning several appointments in advance. Yet, A3's

version only enables the user to plan the next trip in advance, i.e., the application is still more or less about instant intermodal navigation just as A3 seemingly wants it to be.

Overall, incidents like the one described above indicated that who controls the media not only controls which ideas are kept, but also which ones are discarded. That is, controlling the media that contains the final design works in both ways: inclusion of own ideas and exclusion of another teammate's ideas.

6.5.4 Discussion

In the style of Crowell and Scheidel's (1961, p. 155) description of the decision making process in collaborating groups as an idea-in-the-making, we would describe the collaborative design processes of teams as a solution-in-the-making. Over the course of a design meeting, team members suggest ideas, modify their own ideas or another team member's ideas or change the focus of ideas and thereby possibly also in parts the focus of the whole project until the team finally agrees on an emergent solution (Crowell & Scheidel, 1961, p. 155; Lu & Mantei, 1991, p. 98).

Lu and Mantei (1991, pp. 99-102) analyzed videos of the drawing space activities of design teams as well as research on engineering design studies, group communication and social psychology. Some of the behaviors they and other researchers (e.g. Tang, 1991) have observed in design activities were also present in the teams that we have observed. For example, a designer suggests an idea and other group members "[…] make comments on the design either verbally or by sketching out the alternatives" (Lu & Mantei, 1991, p. 99). We, too, observed this kind of collaborative elaboration of design ideas. Another example is the modification of the representation of a previously suggested idea without bothering to discuss the intended editing of the design sketch with the originator of this idea (Lu & Mantei, 1991, p. 100). Again, we observed this behavior also in our study. In addition, we noticed the pivotal role of the shared media that contains the teams' outcome with respect to idea inclusion.

The great importance of the shared media, which is also referred to as shared spaces (Schrage, 1990, p. 98) or shared material (Zerbe, 2000, p. 196f), for collaborative work in teams is not new. For the creative and intensive cooperation in teams plays the shared media that contains the created artifacts, i.e., the team's external representation of their (preliminary) outcome, a vital role (Schrage, 1990, p. 98; Schrage, 2000, pp. xvi, 32; Zerbe, 2000, p. 196f). The information exchanged in a conversation is ephemeral (Schrage, 1990, p. 98). In addition, the respective mental models are prone to distortion (Schrage, 1990, p. 98) because personal understanding is biased and human memory is unreliable (Forrester, 1971; Schwabe, 1995, p. 140). Design ideas embody additional information about context, conversations and gestures (Goldschmidt, 2014, p. 434f; Lu & Mantei, 1991, p. 98), and thus, are more than what is actually represented by a sketch or prototype. Yet, theses representations are pivotal because they provide the basis for the creation of a shared understanding (Møller & Tollestrup, 2013, p. 3f; Schrage, 1990, p. 98).

In our study, we found that if the one, who controls the media (i.e., the workspace) that contains the final design, does not included an idea as suggested or expended by another team

member, this team member gets frustrated and eventually will take over the control of the media in order to included his or her idea accordingly. A similar finding was made in research on computer supported meeting environments. When the designated scriber, who was in charge of writing down the results of the discussed topics, could not meet the meeting members expectations, they become frustrated and took over the control of the media to input their ideas themselves (Mantei, 1989, p. 164). Yet, even though the observed actions are similar in both cases the roles of the participants are not. In Mantei's (1989) case, the role of the scriber was that of a subordinate, whose duty was to write down the other participants' ideas. In our case, on the contrary, all participants were on an equal footing with respect to the contributions they made in the meetings. As a team, they worked collaboratively on the creation of a collective work-product (Katzenbach & Smith, 1993, p. 113). Therefore, the observed effect of controlling the media that contains the final design on idea inclusion is particular remarkable. That is, the one who controls the shared media controls also whether an idea is included or not.

7. Discussion

The pervious chapter presented our findings with regard to factors that lead to idea inclusion in team meetings. In this chapter, we further abstract our findings, which are described in the previous chapter, and present a resulting model on factors that affect idea inclusion in team meetings. Thereby we answer our third research question:

> **RQ3** What are the main dimensions that affect idea inclusion or exclusion in team meetings and how do they theoretically interrelate?

Answering this question leads to an emerging theory about the dimensions and their interrelation that provoke the inclusion (or exclusion) of ideas in team meetings.

The chapter is structured as follows. First, we present and describe our model on the theoretical interrelations of the constructed categories. Second, we explain each category in detail. Thereby, we relate each category to the respective hypotheses and observations that lead to the construction of the category and discuss its occurring and effect. We finish this chapter with a discussion of our model and its components in relation to established theories and research findings.

7.1 The IAMT Model

This section presents and describes our model on the components that affect idea inclusion and their theoretical interrelation. The model was constructed based on our own interpretations and further abstractions of our findings, i.e., the hypotheses on reasons for idea inclusion, which are described in chapter 6. The model provides an abstract view on the theoretical interrelations of the main factors identified in our study that affect idea inclusion in team meetings.

In our ethnographic observation study, we analyzed audio-visual recordings of five team meetings of three teams in which the teams worked on design tasks. We investigated especially the instances in which team members expressed ideas verbally and/or graphically. In this regard, we focused on the idea originator's activities and behaviors as well as the direct responses of his or her teammates in order to decide whether the idea was included or not, and to find out what factors led to inclusion or exclusion of the particular idea. Based on the findings from this study (see chapter 6), we identified four dimensions that affect whether an idea is included or not: (1) inertia, (2) authoritative source, (3) media and (4) time. Figure 7 shows a graphical representation of our model. In what follows, we refer to the model as IAMT (inertia, authoritative source, media, time) and to its components I (inertia), A (authoritative source), M (media) and T (time) respectively.

The three components (I, A, and M) are suggested to have mutual influences on each other that either facilitate or inhibit the inclusion of an idea. That is, each of the three components can affect idea inclusion as well as idea exclusion depending on the circumstances of the situation and the occurrence and strength of the other components. For example, inertia subsumes all aspects that are related to the team's openness to changes of their proposed solution. For one reasons or another, over the course of the project a team becomes

increasingly reluctant to change major aspects of their proposed solution. In this case, inertia facilitates idea exclusion. Possible strategies of a team member to overcome the preserving aspirations of his or her teammates and getting an idea included are the reference to an authoritative source (e.g., the lecturer wants us to include this idea) or turning words into actions (e.g., gain control over the media that contains the final design and include an idea irrespective of the other team members' stance). However, components that work in one scenario in favor of idea inclusion can boost idea exclusion in another one. For example, the control of the media does not only facilitate idea inclusion but also idea exclusion when a team member erases previously integrated aspects of another team member's idea. Here, too, both of the other components may affect the overall outcome of this specific situation. The idea originator has to overcome his or her own inertia to take action in favor of his or her idea. In addition, the team member, who erased the representation of the idea, may additionally provide a reference to an authoritative source that supports his or her decision or he or she can exert authoritative power themselves based on his or her high status in the team. Finally, it has also to be mentioned that the interrelation of the three components, i.e., inertia, authoritative source and media, is not inevitably required to explain why an idea is included or not. In some cases, one of the components is sufficient to explain the observed results. Yet, as teams are complex entities so are, at least in most cases, their interactions that affect idea inclusion and exclusion.

Time is inevitably always present as events unfold over time. Its effects depend, however, on certain conditions including team members' awareness of time and their perception of it (e.g., is the remaining time of the meeting perceived being sufficient for solving the task or not). Team members are not always aware of the amount of time that has passed by or rather is still available for solving the task at hand. When individual team members become aware of the limited available time it can have a strong effect on the other components of the model (i.e., inertia, authoritative source and media). For example, a team member can feel an urge to complete the task in time. Therefore, the team member changes his or her behavior related to his or her assertiveness in the pursuit of own ideas. Team members may also willfully trigger a feeling of time pressure in their teammates, and therefore, change their behaviors and the overall team dynamic. Otherwise, the perception of having plenty of time for solving a task may lead to idling or engaging in not tasks-related activities.

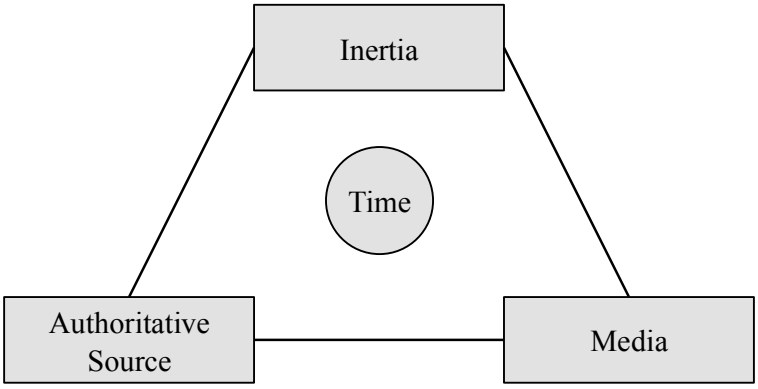

Figure 7. The four components of the IAMT model
(Source: Own illustration)

In the next four sections, we describe each component of the model (see Figure 7). In this connection, we refer back to our hypotheses and examples from our study to show the respective component's grounding in the data. Afterwards, we discuss the theorized relationships and interdependencies between the model's components. In addition, we refer to our hypotheses and use examples from our study to illustrate our interpretations of the factors and their interrelation with respect to idea inclusion or exclusion.

7.1.1 Inertia

The first component of our model is called *inertia*. In physics, inertia describes the resistance of any object to changes in its state of motion. In our model, inertia describes a similar behavior of the team, namely, its resistance to change the state of their proposed solution.

Concerning our study, inertia with regard to the inclusion of an idea can be thought of as the varying threshold that an idea has to surpass in order to be included in a team's result. The threshold depends on several factors including the stage of the meetings as well as the stage of the overall project, the team members' perceived degree of task fulfillment, their satisfaction with the tentative result and their confidence to come up with a superior solution within the given time frame. In addition, the threshold depends on the team's overall degree of openness to experience or more specifically its openness to new ideas. Furthermore, the relative distance between a new idea and the team's tentative solution as well as the scope of the new idea compared to the current solution space's scope affects the threshold that is necessary to overcome a team's inertia in order to induce a change in its proposed solution. That is, the threshold to include an idea that, for example, builds only incrementally on an already included idea is comparably lower than the threshold to include an idea that is distant from the team's solution space. Therefore, in contrast to inertia in physics we perceive a team's inertia with respect to result-related chances as a dynamic variable that is contingent on individual and contextual factors.

Another form of threshold that is related to inertia is the threshold for an idea to become noticed by the other team members. The observed design meetings were messy and we would assume that this circumstance is true for many design meetings in real live, too. In contrast to guided group brainstorming session, in which a facilitator leads the group from one activity (e.g., idea generation) to the next one (e.g., idea evaluation) the observed teams jumped back and forth between generative and evaluative activities over the course of their meeting. Although the teams followed, on an abstract level, a common design process consisting of activities including planning, enacting and reviewing (cf. Goh et al., 2013, p. 163) the teams did not adhere to a strict time schedule that prescribed a certain kind of activity at a certain phase during the meeting. Therefore, team members could be engaged in very different activities at a certain point in time. For example, a subgroup of the team is refining the tentative solution while another one proposes a new idea. In such a case the newly mentioned idea has to overcome the threshold of being noticed at all. In addition, the idea originator has to overcome the inertia of the subgroup regarding the change in their activity, i.e., from refinement of an existing idea to the discussion about the new idea. Similar to other forms of change, the change of activities, too, comes not without effort. Therefore, a threshold has to be overcome in order to get the other teammates moving with regard to the consideration of the idea.

After the theoretical explanation above, we provide in the following our rationale based on our study to show how the model's component 'inertia' is grounded in our data. The category of inertia was mainly constructed based on our reasoning why repeated mentioning (see description of H1 in section 6.2) and the support from others (see description of H2 in section 6.3) resulted frequently in idea inclusion, whereas instances in which ideas were ignored or not further considered resulted frequently in idea exclusion. In addition, we wondered why a team member's bold inclusion of an idea in the meeting's result (see description of H4 in section 6.5) without bothering to convince his or her teammates from the idea was only effective in the short run (i.e., inclusion of an idea in the meeting result) but rather inconsequential in the long run (i.e., inclusion of the idea in the final solution). That is, the inertia of the team in matters of idea inclusion was not overcome but rather circumvented. Yet, we observed also instances in which the presents of an external representation of an idea encouraged team members to discuss this idea, and thus, we belief it facilitated overcoming inertia.

At first we though that the common factor that facilitated idea inclusion in the above-mentioned cases was an idea's "stickiness" (cf. von Hippel, 1994). In contrast to von Hippel's conceptualize of the stickiness of information as the cost to transfer the required information from one unit to another one in a usable form (von Hippel, 1994, p. 430), we though of stickiness as an idea's quality to be remembered by the team members. Yet, if an idea is sticky, why would it need to be repeated several times before it is included or why cannot even the inclusion of an idea in the visual result of the team lead to its permanent inclusion? To explain these effects, too, we thought about related explanations for the observed findings. For example, the common belief that repetition facilitates learning could explain our finding that the repeated mentioning of an idea facilitates its inclusion. Research findings suggest that "[…] recall of conceptual principles and related information increases sharply with repetition […]" (Mayer, 1983, p. 40). Therefore, mentioning an idea repeatedly may increase the chances that teammates remember and recall it. Therefore, repetition of an idea may even facilitate its long-term inclusion (i.e., a team member recalls an idea from a previous team meeting during one of the subsequent team meetings and includes it in the elaboration of the overall proposed solution).

Other possible explanations for the observed phenomena could be the compatibility of a newly proposed idea with respect to the team's tentative solution. That is, the reason for idea inclusion lies not within the team's dynamic sphere of action but is an inherent attribute of the idea. There is no doubt at all about the fact that some ideas are more suitable in matters of bringing the team forward on their way to achieve their goals. Likewise are some ideas more compatible with the tentative solution or exhibit more obvious benefits compared to other ideas. Even though we acknowledge the influence of an idea's compatibility on idea inclusion, our interpretations of the data suggests that group-related factors play a critical role, too. For example, in the first team meeting of team TripAssistant, M2's and M4's behaviors suggest that their statements of consent and dissent with regard to each other's ideas and opinions are not only based on considerations in matters of solving the meeting task but also disclose a power struggle between these two team members. In addition, we suggest that the compatibility of an idea mediates idea inclusion as it influences the threshold an idea has to surpass in order to overcome a teams inertness to change.

On account of the aforementioned reasons we find that *inertia* aptly describes our interpretation of the data. An idea originator uses certain strategies including repeatedly mentioning an idea or soliciting support form other teammates to surpass the threshold necessary to overcome the team's inertia in adopting a new idea.

7.1.2 Authoritative Source

The second component of our model is called *authoritative source*. The reference of other sources to underpin own ideas or lay open the original source of a finding or opinion is a well-known and strongly required approach in scientific writing. In our model, the intended aim of referring to an authoritative source is similar to that in science. First, if we assume that the team member, who proposed an idea, pursuits no ulterior or selfish motives, then the purpose of referencing to an authoritative source (e.g., a lecturer) is only made for attributeing the credit for the expressed idea to its original source. Second, and in a similar vein, the reference to an authoritative source (e.g., a customer) is used for supporting an idea by providing affirmative evidence (i.e., not I but others demand it and therefore we should include it). Third, and definitely not without marks of selfish behavior, a team member refers to an authoritative source in an inaccurate way in order to pretend that a respected authority is demanding a certain feature. The team member uses the reference to an authoritative source for underpinning the necessity to include it.

Concerning our study on inclusion or exclusion of ideas, a team member's referring to an authoritative source can be though of as an attempt to enforce his or her own ideas by utilizing the authority of somebody else, for example, key stakeholder including lecturer, supervisor, customer or corporate partner. In addition, previous group results (e.g., the results of assignments or the content of presentation slides) or environmental conditions beyond the group's control (e.g., deadlines or task instructions) can be utilized as an authoritative source for backing a team member's argumentation for the inclusion of an idea up. Yet, this component cannot only be used to explain idea inclusion. Reference to an authoritative source can be used to support an argument against the inclusion of an idea, too,

Until now, we only discussed the use of an authoritative source to influence the team's result according to a team member's individual opinion. In this case, it is a strategy of a team member to get additional influence on the team's decision in a situation in which he or she is in the minority regarding his or her opinion (cf. Levine & Moreland, 1990, p. 611f). Furthermore, the ideas provided by an authoritative source (e.g., the lecturer) may also be included because one or more team members are of the opinion that they have to include these ideas in order to please the lecturer, who will at the end evaluate and grade their performance.

In the following, we provide our rational for showing how this component of our model is grounded in our data. The category of authoritative source was mainly constructed based on our reasoning why a higher status of the person, who proposes an idea, facilitates its inclusion (see description of H3 in chapter 6.4). In addition, we wondered why the support from certain team members, and respectively also the lack of support from those team members, had a decisive importance in matters of idea inclusion and exclusion (see description of H2 in chapter 6.3). In a similar vein, when certain team members ignored an idea, which was expressed by one of their teammates, it was seemingly more likely to be excluded due to non-

consideration compared to the instances in which less authoritative team members exhibited this behavior. Moreover, in cases of conflicting goals or rather deviant goals of a minority, we found that the authoritative source played a critical role in terms of whose idea was included. But then again, a lack of mental resources for the elaboration of arguments in support of an idea or for considering the arguments of another team member may weaken the effect of the authoritative source.

At first we noticed that some ideas were seemingly included to please the members of the teaching team (i.e., the lecturer and/or the teaching assistants). For example, in the discussion of their results after the second meeting, team TripAssistant received feedback from the lecturer and one teaching assistant. The lecturer proposed among other thing the inclusion of features, which suggest the business traveler how he or she could spend his or her free time in a meaningful way (i.e., entertainment) and help them navigating the surroundings. The first idea was new to the team while the latter one was already pursued in a similar way by M2 in the first and second team meeting. In the next meeting, the team included the entertainment idea of the lecturer in their result. M2 triggered the inclusion of this idea and created the respective screen mockups. Yet, almost at the end of the meeting it became apparent that she included the idea only to please the high status person who proposed the idea. M2 mentions that this part (i.e., the sketches for the entertainment idea) is not relevant with respect to their intended final solution. It just has to be included in the result of this meeting.

Overall, however, instance in which a team member referred to an authoritative source in order to strengthen his or her otherwise weak position, with respect to the inclusion or exclusion of an idea, were more prevalent. In addition, certain team members have seemingly more authority compared to others and therefore are an authoritative source of their own. In relation to decision making about the inclusion or exclusion of an idea, it became obvious that less authoritative members of the team seeked especially the support from the highly authoritative team member for their ideas and opinions. In addition, the highly authoritative member of a team possesses a crucial influence on the team's final result. He or she has become the group's leader based on individual and behavioral qualities rather than because of the assigned role in the team.

On account of the aforementioned reasons we find that *authoritative source* suitably describes our interpretation of the data. In order to include or exclude an idea, a team member uses certain strategies to benefit from the decisive influence of an own leadership skill or refers to another person or an environmental condition that confers him or her an increased authority.

7.1.3 Media

The third component of our model is called *media*. The aim of each team meeting was to solve a certain task. In this context, the teams were asked to create an artifact, or more precisely a prototype of some kind, as a result of the meeting. We use the term prototype here as designers use it typically. That is, a prototype is a learning tool that exists "[…] at any level of resolution […] and may be used at any stage in the design process to explore, evolve, and/or communicate ideas" (Coughlan, Suri, & Canales, 2007, p. 124). Consequently, we understand prototypes as external representations of design ideas that focus only on the aspects relevant to the exploration and communication of those ideas (Lim et al., 2008, p. 3).

The prototypes were created in the form of a short written text, a list of key points, or drawn sketche in the cases, which we observed in our study. The teams used pens and paper or a whiteboard for the creation of the prototypes. Consequently, the representations of the ideas were stored on a physical medium and the resolution of the prototypes was mainly low.

In the context of this thesis, we refer to paper and whiteboard in a general form by using the term media, i.e., the plural form of medium. Therefore, we denominate by media all means or instruments for storing or communicating information. We are aware that different kinds of media and the respectively applyed prototyping methods affect a team's exploration activities, and thus, the ideas created and included in the resulting design (cf. Schlachtbauer et al., 2013). Even though the observed teams used only physical media for the creation and representation of their prototypes, we suppose that the observed phenomena with respect to the effects of having control over the media are not rooted in the quality of the media itself but in the teams' dealing and interacting with the media that contains the final design. That is, whether they use it individually or together and especially who controls its content. Therefore, as all team members worked with the same kind of media we attribute the observed effects on idea inclusion and exclusion on the team members' varying levels of control over the media and how they exercise their control over the media.

Depending on the meeting task and the activities of the teams to solve it, they used the available media individually as well as collaboratively to develop and represent their ideas. As mentioned before, we perceive the act of prototyping as a tool that supports learning as well as the exploration and possible expansion of the design space (Coughlan et al., 2007, p. 124f; Lim et al., 2008, p. 3). The primary purpose of the meetings was the elaboration and advancement of the teams' initial product idea into a sophisticated suggestion for a viable product. In this connection, the used media and the created representations were rather a means to an end then an end in itself. Nonetheless, the media that contains the team's final result of the meeting plays apparently a crucial role with respect to idea inclusion and exclusion. The media contains an external representation of a team's tentative solution. From the perspective of an outsider, one can even think of it as the external representation of a snapshot of certain aspects of the team's shared mental model (cf. Hill & Levenhagen, 1995, p. 1059) of the product to be developed. That is, ideas that are included in the external representation are visible to stakeholders outside the team and therefore a readily observable part of the solution. Whereas ideas that are not included in the external representation are invisible, at least from an outsider's perspective. Therefore, these ideas are not considered as a part of the proposed solution.

Above we briefly explained the importance of external representations in team meetings and pointed out the crucial role of the media that contains the final design in matters of idea inclusion and exclusion. In the following, we provide the rationale for showing how the component media is grounded in our data. The category of media is mainly based on the observations that lead to our hypothesis that having control of the media that contains the final design facilitates the inclusion of own ideas (see description of H4 in chapter 6.5).

In addition, we noticed that in the face of unsuccessful attempts to include an idea based on verbal strategies like repeatedly mentioning an idea (see description of H1 in chapter 6.2) the team members employed sometimes more powerful strategies such as gaining control of the

media. Moreover, our interpretation of the observed dynamics in relation to the successful integration of an idea by soliciting support (see description of H2 in chapter 6.3) depends among other things (e.g., authority of the backer) on the backer's control of the media. Ideas were seemingly more likely to be included in the team's final design if the team member, who was in control of the media that contains the final design, supported the idea. This circumstance highlights again the decisive power of the team member, who is in control of the media containing the final design.

A good example to illustrate both aforementioned phenomena is the third meeting of team A2B. From the outset of the meeting, A3 was in control of the whiteboard, which was intended to contain at end of the meeting the team's result. While A3 was sketching the screen mockups according to his vision of the final product and a previously created tentative screen mockup (which illustrated one of the features the team was working on), A2 and A1 engaged in a discussion about new features and alternative solutions. Especially A2 pushed for the inclusion of additional functionalities with respect to his vision of the final product, which deviated from the initial shared goal of the team. A3 focused on the task of sketching the screen mockups in accordance with the team's previously shared goal. He ignored many of A2's proposed idea, i.e., neither included them nor considered some of them at all. A2 proposed also ideas for features the team already agreed on in the previous meeting. A3 included those ideas (e.g., the notification feature) according to his personal idea of how the feature should be implemented. That is, as long as A3 was in control of the media he was also in almost complete control of the team's meeting result. Only his teammates' assertive persistence in suggesting changes to certain aspects of the screen mockups affected the overall final design. At least until the moment when A2 grabbed a pen and started to interfere with A3's autarchy in matters of the control of the media by first changing only small details in A3's sketches and later by sketching additional screen mockups himself.

Following the English proverb *the pen is mightier than the sword* we found that in relation to design teams *the pen is mightier than the voice*. In contrast to a verbally proposed idea that can be excluded by persistently ignoring it even if it is repeatedly mentioned, there is no passive countermeasure against ideas that were included in the final design in a textual or graphical form. An idea originator's creation of a persistent external representation of his or her idea demands at least a verbal expression of dissent in order to prevent its permanent inclusion. More radical alternatives for opposing the inclusion of this idea would be either altering the existing external representation of the idea or erasing it altogether.

On account of the aforementioned reasons we find that the component *media* suitably describes our interpretation of the data. The purpose of the meetings was solving a design task. Therefore, the result of the meetings was a prototype that functioned as an external representation of the team's tentative solution. Controlling the media that contains this final result is equated with controlling the final result itself.

7.1.4 Time

The fourth component of our model is called *time*. Time is inevitably always present as events unfold over time. In addition, the overall projects as well as the individual meetings are characterized by time constraints. That is, after about 4 month the teams have to present their

proposed solution no matter how finished or elaborated it is. As the development of an innovative mobile app is an open-ended enterprise it is inevitable that a team cannot develop a perfect solution that fulfills all requirements of all possible stakeholder. Therefore, the objective of the projects was to develop a solution, which is good enough to persuade others (e.g., an investor) to support the advancement of the proposed solution, for example by invest addition resources in form of time and money (cf. Kanter, 1988, p. 184ff; Kornish & Ulrich, 2011, p. 107; Scott & Bruce, 1994, p. 582). In addition, also the duration of the meetings was limited by a fixed time period after which the teams discussed their result with members of the teaching team, who provided feedback and gave advice on how to proceed. In short, design activities are often time-constrained (Dow, Heddleston, & Klemmer, 2009, p. 166).

With regard to project teams, time is not only a limited resource (Arrow et al., 2004, p. 77). The studied groups themselves are constantly changing over time through the groups' accumulated experiences (Arrow et al., 2004, p. 74). That time affects groups and their outcome is not new. According to McGrath (1997, p. 15f), real groups and teams have both a past and an anticipated future and because the group activity is dynamic, too, temporal aspects affect groups in a variety of ways. Therefore, we would have been surprised if we had not identified time-related affects on idea inclusion and exclusion in our study. However, unlike the many existing studies and theories on the effect of time on groups (cf. Arrow et al., 2004; Mathieu, Tannenbaum, Donsbach, & Alliger, 2014, pp. 145-147) we have not purposefully tried to find time-related effects in our study but rather identified those effects based on the coding and interpretation of the investigated teams.

We noticed in our observations that the effects of time were manifold and affected all three of the aforementioned categories (i.e., inertia, authoritative source and media). Depending on the circumstances of the situation time-related effects can either facilitate or hamper idea inclusion.

A team's inertia in matters of its willingness to include additional ideas is affected by time in at least two ways: (1) a team's perception of the still available period of time for the discussion and inclusion of an idea and (2) a team's expected effort for the eventual implementation of the idea. In the former case, for example, when a team member highlighted the limited amount of time until the end of the meeting it often lead to the interruption and postponement of discussions regarding the elaboration of a new idea for a solution in favor of sticking to the team's already available tentative solution. In the latter case, individual team members used the perceived high expenditure of time for the implementation of a proposed feature as a reason to exclude it from the project's final result. Both lines of action are reasonable as the teams had to meet the time constraints in each meeting (i.e., finishing the task of the team meeting as good as possible in the available time) as well as for the overall project (i.e., designing and prototypical implementation of the team's proposed solution until the end of the project).

The effect of proposed ideas from an authoritative source are also affected by the time of their occurrences in the project. At an early stage of the project, the team might not yet have a good own idea. Therefore, it embraces the ideas of an authoritative source (e.g., the lecturer who has lots of experience regarding the design and development of creative solutions) and uses them as a starting point for building their own solution. At a late stage of the project,

however, a team might feel obliged to include the idea of an authoritative source (e.g., the person who will finally assess the teams performance) but lacks the time to adapt the idea and integrate it properly into their proposed solution.

We observed both aforementioned cases in our study. First, we provide an example for ideas from an authoritative source at an early stage of the project. Team TripAssistant received an individual feedback from the lecturer after their second meeting. They adopted some of the lecturer's ideas and included them over the course of the next meetings into their proposed solution. During this time, the team elaborated the initially proposed ideas of the lecturer and included it suitably into their own proposed solution. Second, we provide an example for ideas from an authoritative source at a late stage of the project. Five days before the final presentation at the corporate partner's office, the teams were invited to a rehearsal at the university. At this appointment, the teams presented their proposed solution to the teaching team and received mostly feedback in order to improve their talk. The lecturer proposed ideas to improve the proposed solution, too. Team A2B integrated one of those ideas regarding their business model (i.e., not offering their proposed mobile service under their own brand but sell it as a white label service) into their proposed solution but lacked the time to fully elaborate this idea. At the final presentation, the team was not able to answer in a convincing manner the critical questions regarding the idea of offering a white label service. In personal conversations with the jury members we learned that among other things A2B's inability to explain their decision regarding the white label service led to their inferior rating scores.

Time affects the use of the media, too. For example, some team members changed their strategies for the inclusion of their ideas towards the end of the meetings. For example, we observed instances in which a team member tried for most of the meetings duration to argumentatively convince his or her teammates from his or her ideas by repeatedly mentioning it, soliciting support or referring to an authoritative source. Towards the end of the meeting, individual team members applied more assertive strategies for idea inclusion by gaining control of the media that contains the final design. For example, at the end of the first meeting, M2 (TripAssistant) offered writing down the final solution on behalf of the team and included some of her previously mentioned but not included ideas.

On account of the aforementioned reasons we find that the component *time* recognizes our interpretation of time-related effect observed in the data. In our western cultures, time plays an important role (e.g., time is sometimes even equated with money). In addition, team meetings as well as projects are inevitably affected by time constraints, because one of their characteristics is a defined start and end time, and thus, fixed time duration.

7.2 Theoretical Structural Relations and Interrelations

In this section, we elaborate on our IAMT model by describing the theoretical interrelations between its four components. According to Rein and Schon (1977, p. 144f cited by Miles and Huberman (1994)) a theory can be though of as the generalization of a specific story and a model, which is in their interpretation a more elaborated theory, consists of several connected propositions, which specify the model's components and their interrelation. In chapter 6, we

already described our set of hypotheses[18] that was constructed through the application of grounded theory methods for the analysis of ethnographic observations. In addition, section 7.1 describes the components of our model.

The aim of this section is to shed light on the interrelation between different group dynamics and their possible effects on a team's meeting result. We do not aim for the creation of a highly generalized, predictive, causal theory about group dynamics and their effects on idea inclusion and exclusion for the following reasons. In accordance with Miles and Huberman's (1994) description of "causal complexity" (Miles & Huberman, 1994, p. 146) we found that the causes of idea inclusion and exclusion were multiple (Abbott, 1992, p. 433), a combination of circumstances and events (Ragin, 1989, p. 25) and in which "[…] events are tied to each other in a *systemic way*" (Salomon, 1991, p. 14 italics in the original). That is, groups are complex systems with multi-directional and nonlinear interactions, who adapt to their context and are affected by temporal aspects (McGrath, 1997, p. 15). Or as Salomon puts it with respect to classroom events: "No event operates alone, nor is it an independent event that 'affects' others the way billiard balls do" (Salomon, 1991, p. 13).

7.2.1 Theoretical Structural Relations

Based on the analysis of the team meetings, we created four hypotheses with regard to group-related reasons that facilitate the inclusion of an idea. However, with respect to the specific situation and the attempted intention we find that the dynamics underlying our hypotheses can both facilitate or hamper idea inclusion.

Figure 8 gives an overview of the observed dynamics that underlie our hypotheses. In addition, it shows the relations between our hypotheses, the respective dynamics and the constructed categories (i.e., our theoretical dimensions) that constitute the components of the IAMT model. The hypotheses are grounded in our observations (see chapter 6). The respective dynamics are a theoretical interpretation of the observed behavior of team members in terms of pursuing the integration of a proposed idea. Therefore, the dynamics are implicitly associated with its predominantly expected consequence: idea inclusion. Yet, they have to be interpreted with respect to the forces emanating from our model's dimensions (i.e., inertia, authoritative source, media, and time). The dimensions, on the other hand, are neither predominantly associated with idea inclusion nor exclusion but rather provide with their manifestation the theoretical basis for explaining why idea inclusion or exclusion occurred in a specific situation. In this respect, the dimensions *inertia* and *authoritative source* can be considered as team-specific and *media* and *time* as context-specific forces, which foster or impede the theorized effect of the four dynamics.

[18] Instead of using the term "proposition", which is common for declarative statements about the tentative relationships between constructs, we us the term "hypotheses" although it is usually the empirical formulation for stating relationships between measurable variables (cf. Bhattacherjee, 2012, p. 16). We decided to do so in order to stay close to the wording used in matters of the used grounded theory methods (see, for example, Charmaz, 2014, p. 198).

Building on the interpretation of our observations we hypothesized the structural relations between the dynamics and the dimensions as depicted in Figure 8. First, all four dynamics are theorized to affect the inertia of the team regarding the inclusion of an additional idea. In the attempt of a team member to change the team's tentative solution by including his or her idea, the team member has to surpass a certain threshold in order to overcome the team's inertia (i.e., the disposition to stick to what they already have). Thus, the team's current level of inertia affects in turn the success of all four dynamics with respect to idea inclusion. For example, if the team has come to the conclusion that they have reached a suitable solution their level of inertia with respect to change major aspects of the solution is considered as high.

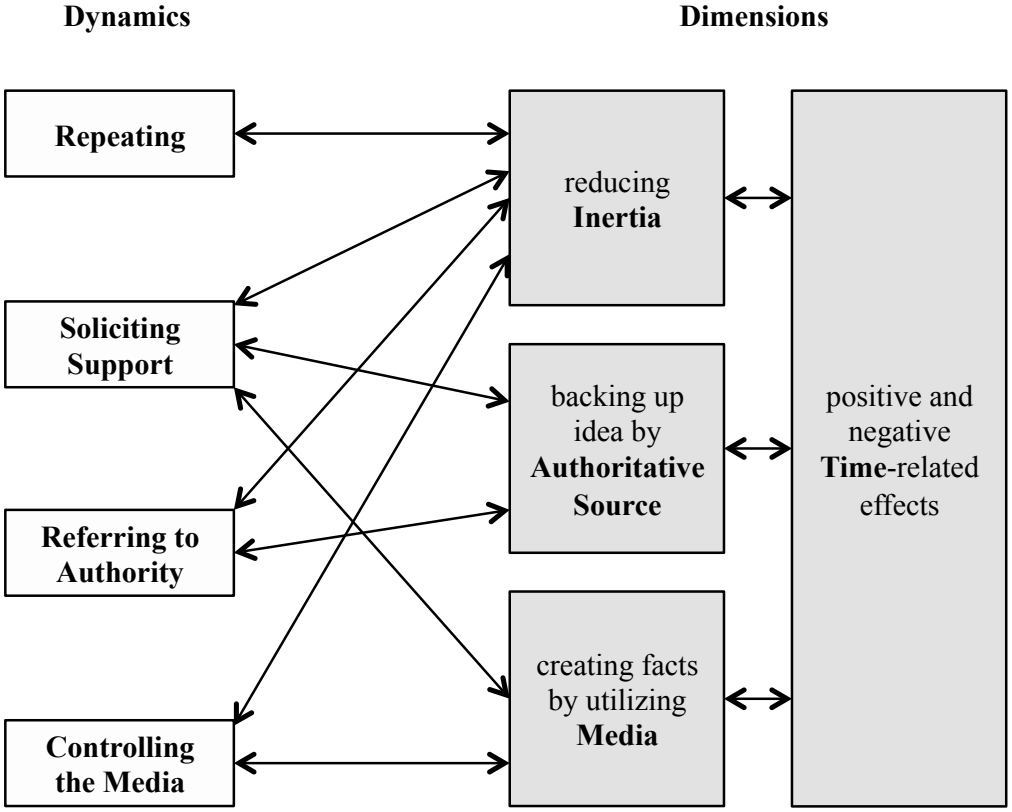

Figure 8. The constructed dynamics and their relations to the theoretical dimensions of our IAMT model
(Source: Own illustration)

Second, it is theorized that two of the four dynamics (i.e., soliciting support and referring to authority) are correlated with the effect of an authoritative source. All observed teams showed to certain degrees responsiveness to some form of authoritative source. Yet, the kind of authoritative source, to which the team members responded, differed. That is, some were more obedient to the opinion of high status persons outside the team (e.g., the lecturer) whereas others were more obedient to the opinion of an influential team member (i.e., the opinion leader within the team). Further authoritative sources are, for example, the majority opinion within the group, previous results of the team (e.g., created screen mockups or user stories) and the opinion of the interviewed potential customers.

Third, it is theorized that two of the four dynamics (i.e., soliciting support and controlling the media) are correlated with the effects with respect to the media that contains the final result. Individual team members used the different available forms of media for the creation of external representations for their ideas. The representations were seemingly used as a thinking aid (i.e., to help the individual person structuring his or her thoughts) as well as a communication aid (i.e., to support his or her verbal explanation of an idea). The latter one can be thought of as a means for soliciting support for an idea. In addition, the utilization of the media by the team in combination with the distribution of the domination over the media had a strong effect on idea inclusion by means of creating an external representation of ideas that are at least conditionally permanent. That is, ideas that were written or drawn into the team's external representation of the final result remained a part of the team's result until somebody removed it again.

Finally, time-related aspects affect again all dynamics in two ways. First, the success of a certain dynamic depends among other things on the timing within the team's course of action. For example, gaining control of the media and including an idea at a too early stage of the meeting could be less successful in the long run compared to the occurrence of the same dynamic at a late stage of the meeting. The occurrence of this dynamic with regard to the inclusion of an idea at an early stage is followed by more subsequent events that can affect whether the idea remains in the result or not. As external representations were not only used to record the team's final design but also as a thinking and communication aid for the elaboration of not yet fully thought-out ideas, changes to the team's external representation of their tentative result were a vital aspect of improving the proposed solution. Second, over time team members learn from past experience whether certain dynamics are tolerated within the team as well as whether they are beneficial in achieving their individual goals or not. Therefore, team members may change their behavior over the course of a single meeting as well as over the course of the whole project. For example, a team member, who verbally expressed his or her ideas throughout the team meeting (e.g., repeating), yet without achieving the intended result (i.e., inclusion of an idea) may change his or her behavior (e.g., from repeating to controlling the media).

The aforementioned changes in dynamics, for example, from *say* to *do* (see also Figure 5 in chapter 5.6.2.2) were frequently observed in all teams across the various team meetings. The next section explains the theoretical interrelations of the dynamics and the dimensions in more detail.

7.2.2 Theoretical Interrelations

In this section we explain the theoretical interrelation between the dynamics regarding the inclusion of ideas in consideration of the dimensions of the IAMT model.

If someone is working alone, he or she can decide for himself or herself whether to include an idea or not. In a team setting other group members' reactions affect and sometimes even determine this decision. In addition, not only does a team's proposed solution change and evolve over time but also the team itself is changing (Arrow et al., 2004, pp. 75,81; McGrath, 1997, p. 15f). For example, team members learn more about their teammates as well as their own and others' preferences and accepted behaviors (Arrow et al., 2004, p. 82). In addition,

they gain more knowledge about the problem and solution space (Harrison & Rouse, 2015, p. 396f; Wiltschnig et al., 2013, p. 516ff). Consequently, the theoretical interrelations between the team dynamics with regards to idea integration are manifold.

With respect to cause and effect relationships, already Abbott (1992) refers to the notion that in social interactions multiple causes lead to particular events. Moreover, the effects of interrelated causes may be different depending on the context, and they may be similar depending on the particular combination of the causes (Miles & Huberman, 1994, p. 146). Salomon (1991) vividly describes this relationship with the following statement: "No event operates alone, nor is it an independent event that 'affects' others the way billiard balls do" (Salomon, 1991, p. 13). Consequently, he suggests that causes and effects are interrelated in a systemic manner, in which all components, events, or actions can potentially affect the network as a whole (Salomon, 1991, p. 14).

Accordingly, in the face of the aforementioned dynamic influences on idea inclusion we find it – in accordance with Salomon (1991, p. 13f) – unrealistic to attribute the inclusion of an idea exclusively to a single cause as our hypotheses in chapter 6 would suggest it. These hypotheses are not statements about a general truth. The term is rather used in its literal sense as a suggestion, which is intended to explain our observations. Yet, even though the theoretical interrelation of the four theorized dimensions (i.e., inertia, authoritative source, media and time) of the IAMT model (see Figure 7) are connected in a network with mutual interactions, it provides only a part to the whole picture as it leaves out the relations between the team dynamics and the dimensions.

7.2.2.1 Explanation of the Theorized Interrelations between the Team Dynamics

In order to explain the theorized interrelations of the team dynamics in the context of their relationships to the IAMT dimensions (see also Figure 8 regarding their structural relations), we provide in Figure 9 a schematic overview of these interrelationships. It has to be noted that the model does not provide a cause and effect relationship between the dynamics, even though the boxes and arrows might suggest it at a first glance. Instead, the arrows show the likely transitions from one dynamic to another in accordance with our observations.

In Figure 9, the different sizes and overlaps of the rectangles that are labeled with the dimensions' names (i.e., inertia (I), authoritative source (A), media (M), and time (T)) depict the range of influence of the respective dimension. That is, T influences all other dimensions, I influences A and M, and A influences M. All of theses influences are reciprocal except for T in the sense of clock time. However, the other dimension also influences T in the sense of an individual's perception of time.

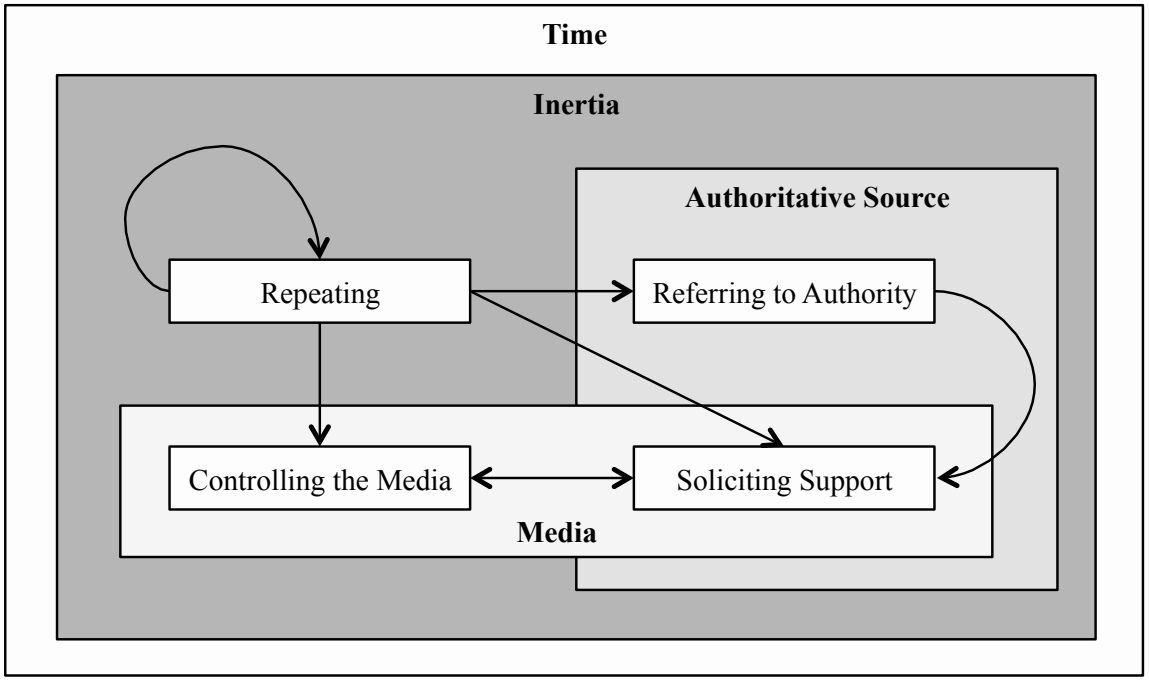

Figure 9. Overview of the theoretical interrelation between the dynamics with respect to idea inclusion in consideration of the dimensions of the IAMT model
(Source: Own illustration)

In the following paragraphs we explain the likely transitions from one dynamic to another. The final dominant consequence is in each case the inclusion of an idea either through the respective dynamic itself or through one of the subsequent occurring dynamics. These transitions are depicted in Figure 9 as the arrows between the dynamics.

First, repeated mentioning was observed as a self-energizing behavior. Consequently, *repeating* is suggested to occur in a loop back to itself. In addition, *repeating* exhibits likely transitions to the three other dynamics. That is, if the repetition of an idea fails, an idea originator often tried one of the following things: (1) back up the idea by *referring to authority*, (2) persuade another team member to support the idea (i.e., *soliciting support*), or (3) gain control over the medium that contains the final design (i.e., *controlling the media*). Although repeatedly mentioned ideas could end up in the final result even in spite of the team's dissent (e.g., to silence the idea originator), we assume, based on our interpretation of the data, the direct effect of *repeating* on idea inclusion as weak.

Second, we often observed that referring to an authoritative source (i.e., *referring to authority*) was followed by either *soliciting support* or *controlling the media*. In the first case, the reference to an authoritative source (e.g., a high status person who likes the idea) was often still used in order to persuade a team member, who already responded to it, to support the idea. In the second case, the idea originator gained control over the medium that contains the final design (i.e., *controlling the media*) and included the idea. We observed that especially references to a high status person (e.g., the lecturer) facilitated the inclusion of an idea. This was particularly the case in teams (e.g., team TripAssistant), whose members were

rather obedient (i.e., thinking to have to do something because it is expected by a higher status person).

Third, we found that the rhetoric persuasion of other team members was especially common in dialogues and discussion within subgroups. In addition, *soliciting support* was seemingly more successful with respect to the inclusion of an idea if the supporting team member was in control over the media. In these cases ideas were sometimes directly included into the result without involvement of the rest of the team. In a similar vein, it was found that a likely transition was from *soliciting support* to *controlling the media*. That is, if the attempts to persuade the team member in control of the media failed, a rather bold strategy of the idea originator was gaining temporarily at least as much control over the media to include the idea. In teams with a highly collaborative working style (e.g., team Tripster), *soliciting support* was a very effective dynamic with respect to idea inclusion.

Finally, we observed in many cases that a crucial factor for idea inclusion was whether or not an idea was written down or drawn into the final result. Based on our observations, *controlling the media* has a likely transition to *soliciting support*. As already mentioned in section 7.2.1, the external representations of ideas were seemingly also used as a communication aid. Therefore, gaining control over the media and creating an external representation for an idea was not always an attempt to integrate an idea into the solution but also to discuss a not yet entirely thought-out idea with others or to persuade them from an idea. This was particularly the case in teams with a highly collaborative working style (e.g., team Tripster). Who controls the media, and thus, the final design, was especially decisive with respect to idea integration in teams with rather autocratic team members (e.g., team A2B). If autocratic team members were in control of the media, predominantly their ideas were included into the final design. Overall, the external representation of a team's tentative proposed solution played a crucial role because it provided the basis for the subsequent discussion with the teaching team. Ideas that were not represented in the result were barely discussed in these feedback sessions. Therefore, the evaluator's consent or dissent with respect to those ideas became not obvious.

7.2.2.2 Illustration of the Dependence of Idea Inclusion on the Interplay between the Originator's Dynamics and the Team Members' Reactions

As mentioned in section 7.2.1, the dynamics (i.e., repeating, soliciting support, referring to authority and controlling the media) are implicitly associated with idea inclusion as its predominantly observed consequence. Yet, as already indicated, the same dynamics can occur as the reaction of another team member to a proposed idea, too. In this case, the associated consequence depends on the position of the team member towards the idea. That is, as reaction to a proposed idea the dynamics can occur in support of an idea or to oppose with the idea. The arising dynamics and their mutual influencing interplay determine in the end whether the idea is included or not.

With respect to the exclusion of an idea, we had observed an additional behavior that was predominately shown by team members who were for some reasons more influential compared to their teammates with respect to decision making. According to our interpretation, we would describe the first behavior with blocking minority and the second with ignoring.

First, we understand by a blocking minority an influential team member who predominately pursuits his or her own ideas and who dismisses others' ideas without discussing or explaining their rejection. As this team member exercises a high decision-making power within the team, his or her opinion has a critical affect on the team's decision regarding the inclusion or exclusion of an idea. That is, with the blocking minority's dissent regarding an idea it is predominantly excluded as long as no other dynamics occur that are persistent enough (e.g., controlling the media) to counteract the blocking minority.

Second, ignoring refers to instances in which other team members do not respond to a proposed idea. Based on the observations we could not tell for sure whether the behavior was consciously applied in order to show dissent without having to argue or whether the behavior occurred unconsciously because of a team member's focus on a different task, activity or conversation. Irrespective of its underlying reason, the consequence of ignoring is that the team member, who proposed an idea, does not get feedback from certain team members with regard to the idea. Ignoring can lead to idea inclusion as well as idea exclusion, depending on the dynamic with which the integration of an idea is pursued (see Figure 10).

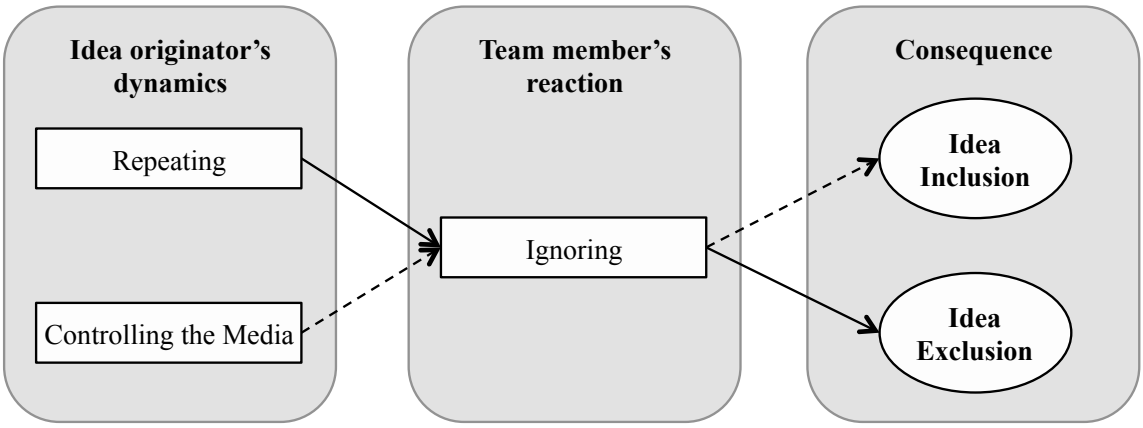

Figure 10. The dominant consequences of ignoring depends on the idea originator's dynamics (solid lines indicate observed path from Repeating to Idea Exclusion and dashed lines indicate observed path from Controlling the Media to Idea Inclusion)
(Source: Own illustration)

7.3 Concluding Discussion

In accordance with the constructivist position of our applied grounded theory approach (cf. Charmaz, 2014, pp. 12-14) we note that the developed model and the theorized interrelations are not an objective representation of reality but our construction and interpretation of the data. Therefore, we discuss in this section our model in reference to established theories and relevant research findings to contrast and evolve our knowledge on team-related reasons why some ideas get included in the result of a team's design meeting and others do not.

Inertia

Project teams as well as their results are dynamic entities that change over time (Arrow et al., 2004, pp. 75,81; McGrath, 1997, p. 15f). This is especially the case when teams are working

on creative challenges, which explicitly require the advancement (i.e., the change) of the results, as it was the case in the projects we have examined in the thesis. However, our findings suggest that idea-related change happens only after a certain threshold has been exceeded.

In the literature there is ample evidence that individuals, groups and organizations are reluctant regarding change. For example, with respect to groups Lewin's (1947) findings suggest a three-step process of change: (1) unfreezing, (2) moving, and (3) freezing. That is, (1) the group is getting ready for a change, (2) the actual change occurs, and (3) the group becomes steady again. With respect to organizational change, Isabella (1990, p. 32) suggests that Lewin's (1947) three fundamental stages of change are accompanied by four interpretive tasks (i.e., assembly, standardization, reconstruction, and evaluation) regarding the process of change in viewpoints.

In a similar vein, our findings suggest that a proposed idea has to surpass a certain threshold in order to overcome a team's inertia (i.e., the disposition to remain unchanged) in relation to changing their proposed solution. On the basis of Lewin (1947) a team's proposed solution (1) unfreezes when an idea surpasses the threshold of the team's inertia, (2) the team moves (i.e., includes the idea), and (3) afterwards freezes the proposed solution again.

The interrelation of a team's inertia and time with respect to the level of the threshold suggested by the IAMT model resembles Gersick's (1988, p. 9) findings, which suggest that a group's awareness of time and deadlines had a stronger effect on the group's progress than the completion of a result in accordance with the current stage of development. However, with respect to idea integration, our findings suggest that the completion of the result plays also a curial role. That is, the threshold for new ideas is rather low in cases in which the team desperately needs ideas for certain parts of the solution in order to finish the respective task in time. On the other hand, in cases in which the team beliefs the solution is already complete, the threshold for new ideas is rather high as the inclusion of each additional idea implies additional effort.

With respect to inertia and its relation to our theorized dynamic *repeating*, effects of minority influence become obvious, too. According to Wood et al. (1994) a minority lacks "[...] by definition [..] power, status, and competence" (Wood et al., 1994, p. 324) and therefore has to exercise influence via a behavioral style. In this regard, they state, "[…] consistent, repeated statements of opinion have emerged as a cornerstone of minority effectiveness" (Wood et al., 1994, p. 325). This is consistent with our observation that repeatedly mentioning the exact same idea was more successful compared to repeatedly mentioning variations or advanced versions of an idea. However, with respect to idea inclusion we have to supplement this view based on our findings regarding the dynamic of *controlling the media*. Our findings suggest that the creation of an external representation for an idea in the team's shared media, which will at the end contain the final design, is an additional cornerstone of minority effectiveness.

Authoritative Source

This dimension suggests that the status (i.e., authority or relevance) of the source, to which a team member refers with respect to his or her idea, affects idea inclusion. Thereby, an

authoritative source can be a key stakeholder of the project (e.g., manager or customer), key information with respect to the proposed solution (e.g., created user stories) or an influential team member.

First, the influence of key stakeholders, for example, a supervisor, on creative individuals and teams is discussed in the literature with regard to the effect of different leadership styles on the creativity of subordinates. In general, these research findings suggest that a supportive leadership behavior fosters the subordinates' creativity (Shalley & Gilson, 2004, p. 40f). Other influencing variables in relation to a higher status person's effect on the creative outcomes of individuals and group are, for example, external evaluation of work or supply of required resources (see, for example, Oldham & Cummings, 1996, pp. 609-613; Shalley & Gilson, 2004, pp. 37-42). However, the influence of higher status persons on groups and teams is predominantly discusses in the literature on social influences with respect to authority and obedience (see, for example, Cialdini & Goldstein, 2004, pp. 595-597). In our study, we noticed also obedient behaviors by certain team members.

Yet, with respect to ideas suggested by a higher status person in a feedback meeting, our research results suggest a more interesting finding than noticing effects of authority and obedience. Our findings suggest that key stakeholder can have a profound affect on a team's proposed solution via their suggested idea. As they are not part of the team they cannot directly change the team's artifacts and their proposed solution. However, when individual team members feel obligated to include the suggested idea and therefore argue in favor of its inclusion, they fight for an idea they have possibly not completely understood themselves. In addition, the idea of the high status person may only be a spontaneous reaction to the team's proposed solution. Therefore, it is not a completely elaborated idea but rather a preliminary idea that would need further elaboration. Furthermore, or observations suggest that when the team is not capable of making this idea their own, its inconsiderate inclusion in the team's result could have severe detrimental effects with regard to the overall proposed solution.

Second, the influence of key information, for example, a previously created user stories, on creative individuals and teams can be interpreted in several ways based on extant research results. Recent research findings suggest that creative workers respond to feedback regarding their prototype either by (1) excavations or (2) adjustments (Harrison & Rouse, 2015, p. 385). In the case of excavation, the creative workers make profound changes from the current prototype to the next one by reusing ideas that were generated in previous brainstorming meetings but have not been further explored yet (Harrison & Rouse, 2015, p. 390). In the case of adjustments, the creative workers make only minor changes, which incrementally refine the current prototype through small additions or subtractions (Harrison & Rouse, 2015, p. 390). In particular in the first case, creative worker use previous ideas as key information in order to address the received feedback. That is, instead of coming up with something entirely new they "[…] 'dig up' old ideas to address feedback providers' concerns or questions" (Harrison & Rouse, 2015, p. 390). This reflects people's tendency to opt for less novel or original, and thus, less risky alternatives (Blair & Mumford, 2007, p. 215f; Mueller et al., 2012, p. 16f). In our study, team members referred, for example, to previously created work results, including user stories or previous prototypes. Both are to a certain degree less novel than the currently proposed idea, and might therefore be more acceptable for the other team members.

In addition, the team may also have already agreed on the importance of a previous work result (e.g., a certain user story). A team member, who currently attempts to include his or her idea, then refers to this commonly accepted key information, which is related to his or her idea. Therefore, the idea originator backs up his or her idea by indicating that the team has already accepted a certain fact and the proposed idea is only the implementation of it. A possible explanation for the effectiveness of referring to facts that the team previously decided to be relevant is Sharot, Velasquez and Dolan's (2010, p. 1231) finding regarding the mutual influence of choices and preferences. That is, a team member could be expected to prefer ideas that are related to choices that he or she has made before and vice versa. Another explanation for the observed effect regarding idea inclusion in relation to referring to key information as an authoritative source could be provoked by the common information bias of groups in decision making (Stasser & Birchmeier, 2003). That is, the members of a group or team have the tendency to "[…] focus on information they have in common rather than unique information" (Paulus et al., 2012, p. 336). As the previous work results provide a common information source, team members may perceive it as valid information (Paulus, 2008, p. 172). Therefore, they may be more affirmative to ideas, which are related to this information.

Third, with regard to opinion leadership, theories on group choice shift suggest that a person's level of confidence and/or the persuasiveness of his or her rhetoric determine how influential his or her opinion is with respect to other group members' change of their opinion (Pruitt, 1971, p. 344). Regarding our study, we would ascribe one (i.e., high level of confidence) or partly both (i.e., high level of confidence and persuasive rhetoric) attributes of opinion leaders to the team members that we would describe as influential with respect to idea inclustion. With respect to our observations, we would suggest that a high level of confidence is mandatory to become an opinion leader while a persuasive rhetoric is only additionally reinforcing this position.

Media

In their study about the creation of a shared understanding in distributed teams, Vlaar, van Fenema and Tiwari (2008) examined the role of communication acts (i.e., sensegiving, sensedemanding and sensebreaking) in relation to sensemaking and the achievement of a shared understanding among the team members. Their findings highlight the important role of communication acts in work teams with regard to the collaborative creation of valuable outcomes (Vlaar et al., 2008, pp. 227, 244-246). In our study of teams in face-to-face meetings, we, too, found that communication plays a vital role. Three of the four identified dynamics that facilitate idea inclusion (namely: repeating, soliciting support, and referring to authority) relied significantly on communication between the members of the team. Yet, references to written or drawn artifacts (i.e., instructions or sketches) were a substantial part of a team's communication, too. So-called pointing actions are a common aid in communications in order to establish a link between a signifier, e.g., a word, on the one hand and a signified, e.g., an object, on the other hand (Deacon, 1998, p. 59f; Linke et al., 2004, p. 155). Besides the use of pointing actions for the establishment of conceptual relationships between individual elements of two sets of elements (Deacon, 1998, p. 60), pointing actions sometimes replaced verbal expressions altogether in the observed teams. Therefore, external representations of ideas became an essential part of the team members' communication.

As a fruitful avenue for further research Vlaar, van Fenema and Tiwari (2008) suggested among other things an investigation of the role of "[…] the artifacts that are being used to advance understandings in distributed work settings […]" (Vlaar et al., 2008, p. 247). Our finding regarding the pivotal role of artifacts (e.g., textual description, presentation slides, sketches or prototypes) regarding a team's creative work during design meetings emphasizes the importance for studying this topic, too.

Although, the importance of artifacts as well as a team's possibilities to interact with them is well established with respect to collaborative design activities and computer-supported collaborative work (e.g. Coughlan et al., 2007; Goel, 2014; Lu & Mantei, 1991; Møller & Tollestrup, 2013; Schön, 1983; Schrage, 1990; Schrage, 2000; Schwabe, 1995; Tang, 1991; Zerbe, 2000), the influential role of artifacts regarding idea inclusion have received less attention in the literature. For example, with respect to collaborative design activities external representations of ideas in form of sketches and prototypes are perceived as tools to "[…] explore, evolve, and/or communicate ideas" (Coughlan et al., 2007, p. 124). Thereby, the spoken words and the visual external representation of an idea supplement each other in an important way (Schön, 1983, p. 80). However, in the meetings, which we observed in our study, external representations played a dual role. During the meeting they were used to facilitate the teams design and the elaboration of their preliminary solution. After the meeting, the external representation of the team's outcome provided the basis for the discussion with external stakeholder (e.g., in our case the members of the teaching team). Even though the external representation of a team's proposed solution needed further explanations, it influenced the discussion in a significant way: what was not represented in the created artifact was not perceived as a part of the team's solution but rather a possible future add-on. That is, the external representation of the team's collective outcome embodied the valid state of information (Zerbe, 2000, p. 199) regarding the team's currently proposed solution. Therefore, decisions about the possible value of the proposed solution as well as feedback for its further advancements were predominantly based on the ideas, which were included in the external representation of the team's meeting outcome.

As discussed above, the theoretical interrelations between the team's dynamics and the team-specific and context-specific dimensions are manifold. In contrast, the resulting consequences of those interrelations might appear being simple: A proposed idea is either included in the meeting result or not. Yet, the inclusion of an idea in the outcome of a design meeting is only the observable part of reality. Consequently, the successful or failed inclusion of an idea into the meeting result was the only observable consequence in our study. Yet, we also have to consider a further consequence of these dynamics. That is, the integration of an idea into a team's shared mental model of the proposed solution.

Individuals create mental models of the problem and possible solutions to share and discuss them with others (Hill & Levenhagen, 1995). According to Forrester (1971), human mental models, however, are fuzzy, incomplete, imprecisely stated, and subject to continuous change: "The human mind assembles a few relationships to fit the context of a discussion. As the subject shifts so does the model" (Forrester, 1971, p. 112). In this respect, the use of shared media, which contain an external representation of the model, for example, on a sheet of paper, a flipchart or a whiteboard (Schwabe, 1995, p. 140), support creative cooperative work by providing a shared and persistent representation of the individuals' mental models in

addition to the exchange of information in conversations (Schrage, 1990, p. 98; Zerbe, 2000, p. 197).

According to Schrage (1990), a great challenge of collaborative work is to "[…] get others to see the world as [oneself does]" (Schrage, 1990, p. 88). He concludes that besides conversations a team needs shared media to create shared understandings (Schrage, 1990, p. 98). The shared media functions as a point of reference that focuses the collaborative work of the team members and enables all members of the team to edit and thereby contribute to the collective work results (Schwabe, 1995, p. 141).

Our findings, too, suggest an essential influence of a team's usage of the shared media on their results. Yet, we want to emphasis the crucial interplay between the conversation about ideas and the representation of ideas, which we have observed in our study. The first three dynamics (i.e., repeating, soliciting support and referring to authority) are predominantly based on verbal behaviors (i.e., someone says something) whereas the last one (i.e., controlling the media) is predominantly based on physical behavior (i.e., someone does something). All dynamics can be complemented, but do not necessarily have to, by the respective other behavior, too. Accordingly, the first three dynamics are associated with mental representations of an idea, i.e., a mental image, which changes over time, with regard to how things fit together (Forrester, 1971, p. 112; Hill & Levenhagen, 1995, p. 1059). In contrast, the last one is associated with external representations, including a text or a sketch on a sheet of paper. For an idea to last in a team's proposed solution and eventually end up in their final design, we noticed that it is crucial that external representations are constantly interpreted and discussed in the team. Even though the external representation is a persistent model of the team's shared understandings, it is only an image of a certain state of this shared understanding. Based on the manifold individual experiences of the team members outside of the team meetings (cf. Arrow et al., 2004, p. 74) a team member's perceptions of certain aspects of the meaning of the external representation may change without being aware of the subjectivities of this change. For example, when a team member conducts interviews with possible users of the developed mobile service, he or she gains a deeper understanding of the users' needs and wishes. Therefore, he or she may interpret certain parts of the external representation of the team's preliminary solution in a different light, and thus, may attribute a different behavior to a depicted feature than his or her teammates do.

In the previous paragraphs, we discussed the vital interplay between conversations and external representations with respect to the collaborative creation of a collective work result in a team. Yet, in conclusion, we want to highlight again the profound effect of controlling the media on idea inclusion in a meeting result. Even though one characteristic of a team is that it is a group of people with a shared commitment to a goal (Hackman, 2002, p. 249; Katzenbach & Smith, 1993, p. 112), it is still a collection of individuals with different ideas on how the common goal can be best achieved. Controlling the media that contains the outcome of a meeting is in this context a very effective means to enforce own idea regarding a solution that addresses the team's common goal.

Time

With regard to project teams, time is not only a limited resource (Arrow et al., 2004, p. 77) but the teams themselves are also constantly changing over time through the accumulated experiences of its members (Arrow et al., 2004, p. 74). Effects of time on groups and their outcome are not new. According to McGrath (1997, p. 15f) real groups and teams have both a past and an anticipated future and because the group activity is dynamic, too, temporal aspects affect groups in a variety of ways. Therefore, we would have been surprised if we had not identified time-related affects on idea inclusion in our study. However, unlike the many existing studies and theories regarding the effect of time on groups (cf. Arrow et al., 2004; Mathieu et al., 2014, pp. 145-147) we have not purposefully tried to find time-related effects in our study but rather identified these effects based on the coding and interpretation of the investigated teams.

Similar to Gersick's (1988) findings, which suggest that a "[…] groups' progress was triggered more by members' awareness of time and deadlines than by completion of an absolute amount of work in a specific developmental stage" (Gersick, 1988, p. 9) we noticed the profound effects of a deadline in meetings, too. If a team member experienced time pressure and/or the related fear that the team won't finish the task in time, then he or she tried to cutoff other teammate's attempts for elaborating ideas by pushing their teammates to hurry up. Depending on the influence of the respective team member these attempts had a more or less profound affect on idea inclusion. In addition, we observed instances in which the reference to the restricted available time was used as a kind of authoritative source with respect to idea exclusion. That is, team members argued in the sense of the following statement: We do not have time to elaborate and integrate this preliminary idea. Therefore we leave it out.

According to Gersick (1988, p. 32; 1990, p. 110f) teams undergo a paradigmatic transition at the midpoint of their project. The team's first meeting determines thereby how the team approaches the first half of the project while the midpoint meeting determines the last half of the project. In our study, we noticed several transitions that might have been related to the single presentations and the respective expected status of the projects (i.e., identification of problems, first ideas, proposed solution and final solution) as well as the feedback the teams' received. In particular, we noticed changes in the observed dynamics within a team over the course of a single meeting as well as over the course of the five observed meetings, i.e., between the second idea presentation and the interims presentation. For example, in team A2B's third meeting A2 exhibited in the first third dynamics that are based on verbal behaviors (mostly, soliciting support and referring to authority but also repeating). A3, on the other hand, was in total control of the whiteboard (i.e., controlling the media) during this time and created the screen mockups for the team's mobile application according to his personal views. A3 included occasionally ideas that were mentioned by A2 and agreed on by A1. Yet he included the ideas according to his views and not those of A2. After about 20 minutes, A2 made a minor change to one of A3's mockups and looked how A3 reacts. A3 was seemingly not pleased but kept A2's small changes. Afterwards, A2 tried mostly to solicit support for his idea by arguing verbally for their relevance and gets often supported by A1 but ignored by A3, who still was in control of the whiteboard. After two-thirds of the duration of the meeting, A1 created awareness by his teammates regarding the limited remaining time.

Afterwards, A2 applied increasingly physical behavior (i.e., sketching of ideas) and included several of the ideas, which he had previously discussed with A1 but had been ignored by A3 so far, by gaining partly control over the whiteboard (i.e., controlling the media). The dramatic change in the team's dynamics after A1 created awareness of the restricted time shows vividly the importance of the time dimension on the team's social processes as well as the meeting result.

Overall, our findings corroborate the importance of the time dimension as highlighted by reviews of literature on team creativity (e.g. Reiter-Palmon et al., 2012, p. 301ff), teams in organizations (e.g. Ilgen et al., 2005, p. 519ff), and team composition (e.g. Mathieu et al., 2014, p. 145).

8. Conclusion

> *There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment in fact. (Mark Twain, Life on the Mississippi)*

In the previous chapter, we discuss our research findings and present our resulting model on factors that affect idea inclusion in team meetings. In this chapter, we state what we draw from our study on idea inclusion.

The chapter is structured as follows. First, we summarize our research study and state our main research results. Second, we state the theoretical implications of this thesis (1) by describing our contribution to research on team innovation and collaborative creativity and (2) by giving an account on our methodological contribution for the investigation of teams and collaborative creative work. Third, we depict the practical value of our research findings. Fourth, we explicate the limitations of our research study and its findings. Finally, we finish our thesis with suggestions for future research projekts.

8.1 Summary

Working in teams on tasks with no obvious answer is widespread in organizations and team meetings are an essential part of this teamwork (Kauffeld & Lehmann-Willenbrock, 2012, p. 131). During these meetings participants discuss ideas to solve problems or to design new solutions. An important question in this connection is: what gets an idea included in a team's meeting outcome? As the reasoning and work processes of collaborating groups and teams exhibit rather randomness than following a linear train of thought (Scheidel & Crowell, 1964, p. 140) we conducted an inductive in-depth study to address this question.

This thesis examines a video collection of meetings of three teams with the goal of generating hypotheses on the evolution of the assigned design problem in team meetings. Using grounded theory and ethnographic observations the inclusion of each team member’s suggestions is examined in relation to why this inclusion occurred.

Overall, it is found that a variety of team dynamics affect whether suggested ideas are kept or discarded. We cannot say whether the inclusion of an idea impaired the final outcome or whether the teams’ final outcomes would be more creative if the lost ideas were included. However, we found that a large number of ideas were included or excluded because of reasons of team dynamics and not because of reasons of product design. With respect to an idea originator’s attempts for idea inclusion, these dynamics are (1) repeating, (2) soliciting support, (3) referring to authority and (4) controlling the media. In addition, we found that team members applied these dynamics also in response to a proposed idea.

Based on the four dynamics in connection with a team member’s proposal of an idea and the reaction of the other members of the team we identified four dimensions that affect whether an idea is included or not: (1) inertia, (2) authoritative source, (3) media and (4) time. Dynamics that affect more of these dimensions (e.g., soliciting support) are hypothesized to have a stronger effect on idea inclusion compared to dynamics that affect only a few

dimensions (e.g., repeating). In addition, dynamics, like controlling the media, that result in an at least temporarily persistent result (e.g., a graphical representation of an idea) are hypothesized to have a more profound effect on a team's final meeting outcome compared to dynamics, which are predominantly based on ephemeral verbal behaviors, like repeating an idea.

This work only develops hypotheses of what affects the final outcome of a team meeting. Yet it suggests that efforts to improve individual or team creativity might not be as effective as efforts to manage team dynamics in team meetings with regard to the feasibility and uniqueness of a team's design. In summary we think we can have more productive meetings that create more innovative products just by following some simple rules.

8.2 Theoretical Implications

8.2.1 Contributions to Research on Team Innovation and Collaborative Creativity

The majority of research on group task performance and group creativity has been conducted in controlled laboratory studies (McGrath, 1997, p. 15; Paulus et al., 2012, p. 328). However, the ad hoc manner, short duration and one-time interactions of stranger, who are set up as a team, does not do justice to the reality of teams (McGrath, 1997, p. 15f). Researcher, who study teams for a longer duration, mostly focus on the question how input variables affect the creative output of a team (e.g. Schilpzand et al., 2011) or use survey research and interviews for their data collection (e.g. Hey et al., 2007).

By using grounded theory methods and ethnographic observations this thesis looked in-depth what factors facilitate idea inclusion in a team's work meetings. Irrespective of considerations of an idea's actual value or quality, we found that individual behaviors and group dynamics have a decisive influence on whether an idea is included in the outcome of a meeting or not.

In addition, research on group creativity focuses mostly on idea generation or the selection of the best ideas (Girotra et al., 2010, p. 591f; Paulus et al., 2012, p. 349). However, over the course of a creative project, teams engage, for example, in less structured exploration phases, in which they try to gain new insights about the project's requirements and the constraints of the solution space (Goh et al., 2013, pp. 173-179). That is, during the elaboration and advancement of an initial idea into a proposed solution a team has to solve different problems and gains additional knowledge that alters the initial idea in important ways. The final product of a team is a composition of the individual team member's ideas that are created and included during the elaboration of an initial idea into a proposed solution. Therefore, how teams consciously and unconsciously choose which ideas to include in team meetings is important. These dynamic processes have received much less attention in research. Yet as our results suggest they might seriously affect a team's final design in a positive or negative way.

We have specifically investigated what dynamic processes get an idea included in team meetings, in which a team addressed a creative task. In accordance with prevalent research findings, we found that personal and social influences affected idea inclusion. For example, we found instances of social conformity, in which individuals tried to gain social approval

from their teammates by changing their opinion to accord with their teammates' point of view (cf. Cialdini & Goldstein, 2004, p. 610; Paulus et al., 2012, p. 349).

Moreover, we also found that one rather mundane dynamics has a very strong effect on idea inclusion: having control of the media that contains the final design. That is, the pen is mightier than the voice. This finding has also important consequences with respect to computer-supported meetings and the use of digital systems for the creation of external representations of ideas. While these tools can reduce detrimental effect (e.g., blocking) with regard to group brainstorming, they create a whole new challenge with respect to techniques and conventions that enable teams to actually work and act as a team (i.e., a group of individuals, who collaborate for the achievement of a shared goal and have shared responsibilities for their collective outcome) instead of a bunch of individuals happening to work coincidently on the same artifact when using those tools.

8.2.2 Methodological Contribution

Although some studies used observational methods, including ethnography or interaction analysis, for the investigation of teams (e.g. Tang & Leifer, 1991; van Osch & Mendelson, 2011), laboratory experiments are still predominant in team research (McGrath, 1997, p. 15; Paulus et al., 2012, p. 328) in addition to studies that are based on self-reports (Paulus et al., 2012, p. 327).

This thesis demonstrates that ethnographic observations could be used in combination with grounded theory methods for the investigation of topics in the context of team innovation and collaborative creative work. In addition, even though grounded theory methods are predominantly used for the collection and analysis of interview data (Charmaz, 2014, p. xviii), we applied these methods with ethnographic observation data (cf. Charmaz, 2014, pp. 20f, 35ff). That is, our study shows that grounded theory can be also conducted at the ethnographic level, not simply with interviews.

In addition, our research demonstrates the value of observational methods like video-based interaction analysis and ethnographic observations. Based on the difference between what people told us during the project and what we observed in the videos, it is questionable whether interviews would have enabled us to yield similar findings. During the project, the teams presented themselves as a single entity with a common goal. Only after the projects were completed, some participants complained about their teammates' behaviors because they were not pleased with their grades. In both cases interviews and other self-report methods would probably deliver a distorted picture of reality and hamper conclusions with regard to the dynamics that led to the inclusion of ideas.

8.3 Practical Implications

In today's organizations, there is a widespread belief among business leaders that teams are superior compared to individuals for tackling non-routine tasks that demand creative solutions (Sawyer, 2012, p. 231). Extant research findings support a number of the business leaders' popular beliefs. Even though teams are not for every task the best choice (Hackman, 2002, p. 148f) they are necessary for solving many of the complex and interdepended tasks in

organizations (Goh et al., 2013, p. 160; Paulus et al., 2012, p. 327). In addition, there are good reasons for having teams, including a more comprehensive elaboration of ideas, taking different points of view and a broader knowledge base into account, division of labor, and the reflection of ideas.

Yet, not all teams can make use of their theoretically available potential. Based on our findings with regard to the team dynamics that affect idea inclusion we suggest the following ideas for managing teams better or rather training teams to behave better. First, as has been already suggested by other researchers (e.g. Dow et al., 2011; Girotra et al., 2010) team members should iterate between individual and collaborative work phases and share not only one but several ideas with their teammates. This reduces the personal attachment to individual ideas, provides more possibilities to combine ideas or parts of ideas in novel and useful ways, and encourages more idea exchange between the members of the team. A possible additional enhancement of the collaborative work process is the application of a round-robin model for the individual contribution of thoughts or ideas during the team's collaborative working phases. An important aspect is that the separately created ideas are discussed and reflected on in the team. Without sharing and discussion ideas in the team they are lost.

Second, based on the observed impact of a team member's control of the media (e.g., the whiteboard) that contains the final design we suggest that passing around the control of the media would benefit the final design. This diminishes the resistance to interfere with the manifestation of the team's proposed solution. For example, if only one team member creates the external representation of the team's proposed solution other members of the team might shy away from changing aspects of this representation because they do not want to interfere with their teammates creation. When all members of the team work collaboratively on the creation of the external representation of the team's proposed solution, then they may develop a sense of shared ownership and feel more encouraged to include their ideas in it. Computer-supported design environments facilitate not only the concurrent access to a shared drawing space but enable also the creation of layers for proposing tentative solutions before they are included or excluded based on the team's decision (cf. Huber, 2011; Lu & Mantei, 1991).

Third, as the team holds a shared responsibility for their collective work result the team members should be required to find supporters for their ideas before an idea is included in the team's final result. This is a common approach that is used by crowdfunding platforms like Kickstarter[19]. That is, ideas are only pursued if other team members back the idea up. This should facilitate team cohesion. In addition, it requires team members to explain their ideas in a way that convinces other team members. Thereby possible weaknesses of an idea may become obvious. The idea is then either dismissed or it is further revised until the shortcomings have been remedied.

Fourth, as authoritative persons outside the team can have a decisive influence on a team's final outcome, these high status persons should be included already at the early stages of a project rather than only at the final stages. No initial idea is flawless not even the idea of experienced or high status persons. The exposure of the team with these ideas at an early

[19] https://www.kickstarter.com/

stage of the project gives them enough time to detect possible weaknesses of the suggested ideas and to assimilate the ideas in a critical and reflective manner.

8.4 Limitations

Due to the inductive nature of our study and the common weaknesses of empiricism, we did not attempt to develop highly consistent generalizations of patterns for the observed dynamics pertaining to idea inclusion (cf. Scheidel & Crowell, 1964, p. 140). We only developed hypotheses about what gets an idea included and theorized about the underlying dynamics in connection with context-related and team-related dimensions. Yet we did not test our theory. That is, as this study is hypothesis-generating and not hypothesis-testing its findings must be interpreted with caution.

All research approaches have certain weaknesses and strengths. We think that the use of the constructivist grounded theory approach in combination with observational data was particularly appropriate in this research. Even though our findings cannot be generalized to each and every setting in which teams work collaboratively on a task during a meeting, the rich data gathered in this study in combination with the applied in-depth analysis methods enabled us to generate a set of insights that lend additional support to some findings from controlled laboratory experiments and broadens our perspective on the manifold interplay of context-related and team-related factors that affect a team's work result. The theoretical model, which was constructed on the basis of our empirical findings, suggests that a team's acts to include an idea depend on the team's current level of inertia, the influences of authoritative sources inside and outside the team, and the media that is used as shared material for the creation of work results as well as how the media is used. In addition, all three dimensions of influences are dependent on time. This is true within one meeting as well as with respect to the timing of the meeting within the entire project.

In addition, only one person conducted the analysis. Therefore, the interpretation of the observations is based on his individual background assumptions and the disciplinary perspectives of information systems research; both may have influenced the selection of the research topic as well as the conceptual emphases (Charmaz, 2014, p. 30). In order to counteract these influences, we discussed our preliminary findings and results with other doctoral candidates as well as post doc researchers at the Chair for Information Systems and stood in an intensive exchange of ideas with a renowned scholar with more than 35 year of experience in academic working across disciplines, including psychology, sociology, management, computer science and information systems.

Further limitations in terms of the generalizability of the findings are based on the research design of the study. First, we only observed three teams over the course of one project. The in-depth analysis of video-based data is very time consuming and cannot easily be delegated (Jordan & Henderson, 1995, p. 50). In addition, the interpretation of observations by a single judge helps to ensure consistency in studies with the goal to create a detailed understanding of entire interrelated episodes (Gersick, 1988, p. 36), like in discourse analysis (e.g. Donnellon, Gray, & Bougon, 1986, p. 54). Yet, as mentioned before, we engaged in discussion about our observations with other researchers as suggested by Jordan and Henderson (1995, p. 44). Second, we could neither videotape nor directly observe all meetings and all interactions of

the team members. Therefore, we have only a limited understanding of the teams' interactions and discussions in meetings, for which we have no data. Based on informal conversations with the teams we know that many of their individual team meetings were computer-mediated by using video calling as well as cloud-based collaboration and data-sharing software. Third, the observed teams used only physical media (e.g., paper or whiteboard) for the creation of their work results during the meetings while they used digital systems (e.g., laptop or tablet computer) to access their previous work results. As noted before, teams used digital tools to support or enable their collaboration in some of their meetings. Therefore, it would be interesting to see whether the same dynamics also apply in computer-supported meetings (as we would suggest based on our own experiences). Fourth, we did not measure all possibly relevant characteristics of the team members. For example, we did not consider the distribution of the big five personality traits (McCrae & Costa, 1989) or team members' leadership styles (Aime et al., 2014; Shalley & Gilson, 2004). Although research findings suggest that, for example, the distribution of a team's openness to experience affects the creativity of the final design (Schilpzand et al., 2011, p. 67) we focused in our study on external observable behaviors, because we were interested in the effects of group dynamics on idea inclusion.

A limitation in terms of our study's practical implications is the use of a convenience sample of students. Yet, teams of students are commonly used in research studies, as they are known for providing useful insights into the dynamics of collaborative work in teams and team creativity (Chiocchio & Essiembre, 2009, p. 385; Gersick, 1990, p. 99; Paulus et al., 2012, p. 327f). A further limitation in this respect may result from the fact that some of the team members knew each other before or even were friends. This might have influenced their behavior in ways that are not likely to occur in companies. Yet, research on work practices in creative companies show that these companies actively foster activities that facilitate the formation of friendships and informal information exchange among its employees (e.g. Hargadon & Bechky, 2006, p. 498).

Another possible limitation of this study arises based on the question whether the use of recording instruments during the observed meetings biased the social situation. The knowledge of being recorded can influence participants' mental processes and behaviors in the discussion and interaction with others (e.g. Duval & Wicklund, 1972; Silvia & Duval, 2001). In accordance with Kauffeld and Lehmann-Willenbrock (2012), we would assume that "[..] a demanding activity that is of importance to the participants […] should let them forget the recording instruments" (Kauffeld & Lehmann-Willenbrock, 2012, p. 150). After the completion of the project, we asked individual participants about their perception of being video recorded during the meetings. Participants noted that at the beginning of the meeting, i.e., when the recording devices were started, they were aware of the fact that they are recorded. However, as soon as they started working on the meeting task they forgot about the recording devices, because they were totally engaged in the task at hand. Our observations support the participants' statements because we noted many events that suggest a low reactivity to the recording. For example, team members discussed about the teaching team and the corporate partner, answered cell phone calls, consumed beverages, told jokes, made fun of their preliminary results and engaged in conversations unrelated to the project.

Overall, we were willing to deal with the confounds of the close-to-reality setting of our study and sacrificed the rigor of controlled experimental studies, hoping that the results of our research shed new lights on the evolution of assigned design problems in teams. We believe that our research findings are valuable to both researchers and practitioners: they provide not only empirical evidence regarding the decisive influence of team dynamics on a team's work results but also shed new light on how to manage a team's work meetings in order to have more productive meetings that create more innovative products.

8.5 Suggestions for Future Work

As with any study, there are always opportunities for further research in order to address the limitations, validate the findings or gain additional knowledge.

This research study is hypothesis-generating. Future research could test the hypotheses in a more controlled research setting. For example, student teams that work on similar projects as those in our study could be used in controlled laboratory experiments to ascertain if our hypothesized dynamics actually affect idea inclusion in the predicted ways. Moreover, even though we investigated already student teams that worked on projects for a corporate client (cf. Barczak et al., 2010, p. 342) future research could examine our hypotheses by conducting longitudinal studies of teams in companies. Thereby, actual project teams could be studied during their work on real business issues or innovation projects in order to investigate if the dynamics, which we have found with our student teams, occur also in these teams with the same effects regarding idea inclusion. This would address the limitations of this study regarding the use of student teams with respect to the practical implications, too.

With respect to the inherent difficulties of gathering audio-visual data of teams working on innovative projects in big companies - like we experienced them at a premium car manufacturer in the automotive industry - we would suggest to investigate instead entrepreneurial teams. With a striving startup ecosystem in Europe (Blau, 2014, p. 7) and a growing number of researchers from the Technical University of Munich (TUM), who "[…] spin off their ideas in startups of their own" (Blau, 2014, p. 8), this environment seems to be very attractive for a longitudinal study on team dynamics and their effects on idea inclusion. A very promising starting point for our future research would be, for example, the Garching Technology and Business Incubator[20] (short GATE) at the site of TUM. The GATE was founded in the context of the high-tech offensive launched by the Free State of Bavaria in 1999. Thereby, the GATE has established itself as the bridge between the scientific development of ideas and the establishment of a company with market-ready products. Besides, the close collaboration between TUM and GATE would enable us to train the observed teams with strategies for running more productive and creative work meetings and assess the effect of our training afterwards.

In an iteration of our study, we would, in addition to the collection of audio-visual data of team meetings, also conduct interviews with the participants at various occasions in order to include the participants' subjective views into our interpretations of the data. For this purpose,

[20] http://www.gategarching.com/

we would conduct short interviews with each team member directly after the team meeting to survey their individual experiences and perceptions of the meeting. Additional interviews should be held after the team achieved significant milestones (e.g., after a successful pitch for venture capital). Moreover, we would invite the project teams to create a detailed project journal that shows the development of the team's initial idea into their final, market-ready product. Furthermore, it would be beneficial if the researcher himself or herself was an active member of one of the observed project teams. Even though this kind of participant observation comes with pitfalls of its own, it enables the researcher to take part in a majority of the team's activities and allows him or her to gain an insight perspective on the dynamic processes in the team as well as during the team meetings.

Aside from the investigation of what team dynamics get an idea included into the meeting outcome, we suggest to investigate why ideas are excluded as well. In our study, we noted that the same dynamics that occur in terms of idea inclusion also occur as responses of the other team members to a newly proposed idea. In addition, we noticed further dynamics that counteract idea inclusion, and thus, lead to idea exclusion. For example, a team member's deliberate non-consideration of a proposed idea could counteract dynamics like repeating or soliciting support. In addition, we observed instanced, in which too much information led the team or individual team members to forget about previously discussed ideas. Hence, information overload could also cause the exclusion of innovation ideas. Therefore, we find that the topic of idea exclusion is a relevant supplement for further investigations of team dynamics regarding idea inclusion.

Furthermore, research is needed that addresses specifically the temporal aspects of idea inclusion in teams. The theoretical model constructed on the basis of our empirical findings suggests that a team's acts of including an idea depend on the team's current level of inertia, the influences of authoritative sources inside and outside the team, and the media used as shared material for the creation of work results as well as how the media is used. In addition, all three dimensions of influences are dependent on time. This highlights again the importance of McGrath's (1991, pp., 1997 #1373) emphasis on temporal aspects (McGrath, 1991, pp. 163, 164f; 1997, p. 15f) and situational aspects (McGrath, 1991, p. 166ff; 1997, p. 14ff) in small group and team research. The importance of considering also situational aspects in research on collaborative and team creativity is increasingly recognized (e.g. Paulus & Dzindolet, 2008, p. 229f; Paulus et al., 2012, p. 330). In addition, the dynamic and temporal aspects are increasingly considered in research on teams (e.g. Mathieu et al., 2014). Yet with the dominance of laboratory experiments and self-reports (Paulus et al., 2012, p. 327) the manifold influences of time-related aspects on the work results of teams in general and idea inclusion in particular need still further investigation.

In the style of the proposition *I think, therefore I am* by the French philosopher René Descartes, we want to end this thesis with the following proposition that is worth thinking about with respect to some people's reluctance to write down the result of a meeting:

I write, therefore I control.

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Appendix

A Consent Form

Study of the behavior of project teams

I have been informed in writing that this study will examine my behavior while using methods of idea generation and prototyping in project teams. I consent to participate in this study. I understand that my responses will be kept strictly confidential and will be used for research purposes only. I was informed that results from this study will be published in summarized form. If I so desire, I have the right to view my videotape and/or to request its erasing. I also understand that I may refuse to participate or withdraw from the study at any time, without any penalty or prejudice.

I, _____, have read the consent form, understand and confirm with my signature that I voluntarily participate in this study. All my questions were answered and I currently have no further questions. Should questions arise during the investigation, I can contact the experimenter Mr. Schlachtbauer at anytime.

I hereby give my consent that I voluntarily participate in this study. A copy of this consent form has been given to me.

_____ _____

Place and Date Participant's Signature

_____ _____

Place and Date Tobias Schlachtbauer, Researcher

B Customized Version of the Jeffersonian Transcript Notation

The following annotation conventions are adapted from the transcript notations as defined by Jefferson (2004). The basis for our customized transcript notation is provided in Woods and Fassnacht's (2014) help section of the qualitative data analysis tool Transana. Their version of the Jeffersonian transcript notation is based on the following book section: Jefferson, G. (1984). On the organization of laughter in talk about troubles. In J. Atkinson (Ed.), Structures of Social Action (Studies in Emotion and Social Interaction, pp. 346-369). Cambridge, United Kingdom: Cambridge University Press. This notation was only used inside the data analysis tool Transana, but not for the examples provided in chapter 6 to keep them easier to read.

Convention	Name	Use
[text]	Brackets	Indicates the start and end points of overlapping speech.
=	Equal Sign	Indicates the break and subsequent continuation of a single utterance.
(# of seconds)	Timed Pause	A number in parentheses indicates the time, in seconds, of a pause in speech.
(.)	Micropause	A brief pause, usually less than 0.2 seconds.
↓	Down Arrow	Indicates falling pitch or intonation.
↑	Up Arrow	Indicates rising pitch or intonation.
,	Comma	Indicates a temporary rise or fall in intonation.
-	Hyphen	Indicates an abrupt halt or interruption in utterance.
:::	Colon(s)	Indicates prolongation of a sound.
(hhh)		Audible exhalation
•or (.hhh)	High Dot	Audible inhalation
(text)	Parentheses	Speech which is unclear or in doubt in the transcript.
((~~italic~~ text))	Double Parentheses	Annotation of non-verbal activity.
ADDITIONALLY ADDED Mark-up conventions		
{ text }	curly brackets	Contextual information is added between curly brackets { } only if it is relevant to the understanding of the interaction or to the interaction as such. If it is deemed important to indicate the length of the event, this can be done by adding the number of seconds in parentheses. (VOICE_mark-up_conventions_v2-1; 21. Contextual Events)
@	at-sign	All laughter and laughter-like sounds are transcribed with the @ symbol, approximating syllable number (e.g. ha ha ha = @@@). Utterances spoken laughingly are put between tags. (VOICE_mark-up_conventions_v2-1; 10. Laughter)
<L1de> text </L1de>		Utterances in a participant's first language (L1) are put between tags indicating the speaker's L1 with the language indicated, e.g. de = German. (VOICE_mark-up_conventions_v2-1; 14. Non-English Speech)