MASTER'S THESIS
CREATIVITY IN INNOVATION PROCESSES
A STUDY OF THE INFLUENCE OF CREATIVITY IN THE CONTEXT OF 'INNOVATION INSPIRED BY NATURE'
COPENHAGEN BUSINESS
SCHOOL

MSOC. SC ORGANIZATIONAL INNOVATION & ENTREPRENEURSHIP

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Executive summary

The purpose of this study is to explore insights related to how creativity and innovation are interlinked. As the concepts of creativity and innovation are rather broad constructs, the focus of this study is set on the element of creative activities in a specific innovation process. With this focus the aim is to contribute to the practical and academic understanding of how creativity is influencing and affecting the innovation process in the chosen context. In order to reach this aim the examination of the problem has been conducted in three steps. Firstly, the most prominent theoretical process models within the field of creativity and innovation has been selected, analyses and synthesized into one integrated explorative framework. Secondly, the empirical case, which is constituted of creative exercises in an innovation process, has been studied with qualitative observations to gain further empirical insights to the problem in practice. Thirdly, the theoretical and empirical findings have been discussed conjointly to elucidate the problem from both a practical and theoretical perspective. In this study it was found, how the explorative theoretical framework and the empirical findings explain the same elements and objects being studied in different ways. In practice it was found, how working with either a closed problem related to product or an open problem related to concept, had an effect of how the exercises for creativity was utilized in the process, and how the innovation process progressed. From a theoretical point of view insights explaining these differences fully is absent. In practice it was also found, how the element of problem structure generated different patterns of prototyping, idea generation, selecting and testing of ideas. In terms of how the innovation phases and the role of creativity within the phases are weighing across time, practice and theory in additionally provides various explanations. From the base of this study, it is recommended to pursue further research on some of the aspects that this study did not cover. It is recommended that future studies should look into the aspect of structures, knowledge, interdisciplinarity, outcome and other contexts in order to get a better understanding on how creativity and innovation are interconnected.

Illustrations for cover and introduction pages
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Chapter 1.

Introduction

The phenomenon of creativity has been well accepted in the field of innovation for both researchers and practitioners, through its gained popularity in more corporate settings, with the understanding of creativity as *the* new pathway to economic success (Sawyer 2012). Attention towards creativity as an extremely efficient element in enhancing the idea generation phase in innovation processes, in order to create greater and more profitable innovations, has been formed (Amabile 1996; Glynn 1996; Kanter 1983; Tushman & O'Reiley 1997). It seems like a consensus is establishing a taken-for-granted understanding considering creativity as the means to innovation, leading creativity and innovation to be used interchangeably at times (Cokpekin & Knudsen 2012; Houghton & Dawley 2011), even though they are distinct constructs and have historically developed and been studied separately and in different ways. Creativity grew up in psychology and social psychology, whereas innovation grew up in management/organizational studies and sociology. Nonetheless, what do we essentially know about the relationship between creativity and innovation?

The essence of the current theoretical understanding can be embedded in the assumption exemplified here by acknowledge researcher Theresa M. Amabile: "*Successful implementation of new programs, new product introductions, or new services depends on a person or a team having a good idea – and developing that idea beyond its initial stage*" (Amabile et al. 1996), and in this view innovation is built on creativity (the creative idea). However, one thing is to suggest that creativity is theoretically linked to innovation, and quite another to demonstrate it empirically.

A few empirical studies have been executed in order to grasp the interrelatedness of innovation and creativity. To mention a few; Mohamed & Rickards (1996), Bharadwaj & Menon (2000) found that the presence of both individual and organizational creativity mechanisms led to higher innovation performance; and Cokpekin & Knudsen (2012) added to this research, stating that this relationship is not generable, but contingent upon innovation type. Contradictory, another recent study by Sohn & Jung (2010) did *not* find any direct link between organizational creativity and innovation. Some studies have found a *bridge* between creativity and innovation, thus leaving a 'missing link' with an unanswered question; how are creativity and innovation interlinked?

1.1 Problem statement

There is a lack of research showing the interrelatedness between innovation and creativity. Both researchers and practitioners operating within the field of creativity and innovation will have great interest in exploring empirical material related to the ´missing link' that is to be found, when looking into the relationship between creativity and innovation. New insights and methods that can bridge the gap, reject, confirm or even just improve the assumption, that creativity is important for organization in their innovation processes and in its need to fully understand the phenomenon are of interest. Although, I recognize that a fully exploration of the 'missing link' is not possible at this time. Therefore this thesis serves to address a problem that is related to the 'missing link': *How is creativity influencing and affecting the innovation process.* By looking into this problem empirically I can address one aspect of how creativity has its importance in the process of innovation within a specific empirical context.

1.2 Contextualization of problem

This problem derives from both theoretical and practical discovery that became evident when investigating literature, on this specific matter, and when engaging in conversation with practitioners from the field. This thesis perceives researcher of innovation and creativity as well as practitioners as the audience for the research.

The context of where the problem exists is found in settings, which are applying creative disciplines to their innovation processes, with limited knowledge of how creativity essentially contributes to the innovation processes. In addition, the problem exists in current literature, which is building the connection between creativity and innovation on an assumption, which provides close to none explanation of the interrelatedness. An assumption is clearly not sufficient in an expanding field, which importance is increasing in modern society and needs more attention.

A solution to this apparent problem does presently not exist. Thus, this brings first and foremost a responsibility to provide novel methods for studying and analysing such a topic in

order to gain richer insights to the problem. This can be done through challenging the conventional way of approaching the problem. Through a new focus - a fresh pair of eyes - of rather focusing on the actual creative process unfolding in the innovation process and by experiencing it up-close. This will be of interest to practitioners, if changing the way creativity is utilized, and for researchers, if changing the way we understand this interrelatedness. Firstly, this solution will contribute with an exploratory empirical case where the new ways of analysing will be applied. Secondly, this will contribute to a case of how to study the relationship between creativity and innovation. It will provide methodological challenges to a field in progress and open up for a discussion on how one can work with this specific problem in the future. An expected outcome for this thesis is to provide a new integrated framework for creativity and innovation where the interrelatedness can be explored.

1.3 Research question

On the basis of the problem statement this thesis explores the following research question:

> ***How is creativity influencing and affecting the innovation process at 'The Innovation Inspired by Nature Summer School 2013'?***

In this effort, I conduct a two-pronged analysis in which the two below sub questions are explored, respectively:

> ***Q1: How can the creative process and the innovation process be combined theoretically in an integrated explorative framework?***
>
> ***Q2: How does the creative exercises occur in relation to the innovation process at 'The Innovation Inspired by Nature Summer School 2013'?***

1.3.1 Clarification of research

Q1: The first sub questions serves to gain a comprehension of what researches currently know about the creative process and the innovation process, in order to provide a suggestion of how the creative process and the innovation process can be integrate the two

in a theoretical manner. This is done by investigating, selecting and integrating prominent models and theories, of the respective process, which have contributed to the field of study.

Q2: The second sub questions serves to analyse how the creative process actually unfold in the innovation process. This is done through an empirical case with real-time observations to provide rich insights of how the relationship between creativity and innovation occurred in practice.

The findings from answering Q1 and Q2 will lead into a discussion, where the research question will be answered through a discussion of how theory and practice explains the development of the process of creativity and innovation. The two sub questions will provide me with both theoretical and practical understanding of the process.

1.4 Field of interest

The momentum and popularity that creativity has gained within the field of innovation have and still is of great interest to me. A curiosity towards the fact that the phenomenon of creativity and innovation are very distinct constructs, yet still so naturally combined. An almost taken-for-granted perception of the two has especially caught my interest. In addition, it is interesting to examine a field in progress. What make it even more interesting are the contradicting studies, which strives to build a connection between creativity and innovation with extremely various outcomes. With a leading interest in creativity, this interest will naturally scope this thesis by focusing predominantly on the elements creativity, rather than innovation.

1.5 Purpose

The purpose of this thesis is to gain insights related to the 'missing link' between creativity and innovation. This consequently, directs attention towards creativity in corporate innovation processes and not in arts and design, which have been highly associated with creativity. In addition, this thesis strives to direct attention towards this problem as it has been

overlooked by many researches, which have mistreated the connection between the two and instead build their work on the mentioned assumption, and continued their research with focusing on how to enhance and apply creativity in innovation processes. The purpose is to explore how creativity and innovation are linked, by focusing on the actual process where creativity and innovation unfolds.

1.6 Empirical context

In order to answer the research question, an empirical case is needed to explore how creativity and innovation is linked to one another in the process itself. The empirical fundament becomes crucial as empirical literature and knowledge regarding the link between creativity and innovation is insufficient at this point in time.

The Summer School 'Innovation Inspired by Nature 2013'

'Innovation Inspired by Nature 2013' is a three-week long programme, where master students from Technical University of Denmark (DTU), Copenhagen Business School (CBS) and University of Copenhagen (UCPH) works in interdisciplinary teams to solve a real-world challenge (Appx. 1). The challenges will be proposed by four different companies. There will be two teams set to solve each of the cases. The students will be guided through an innovation process based on methods and approaches from biology functions, systems and processes found in nature. These methods and approaches should help the students to solve the real world problem with the inspirational resources. The groups are to be designed with an interdisciplinary scope making sure that the students are matched equally between the different disciplines and academic backgrounds. Despite their different backgrounds, the students are to read the same curriculum centred in the academic fields innovation, biology and interdisciplinarity. All the students are to acquire practical approaches, methods and academic theory that are utilized through practical and academic elements. Those shared elements should enable the groups to solve the real-world challenge, thus give the students a shared language to work from.

This case provides great conditions to study the phenomenon of creativity and innovation. Even though the case is based on a master student course, I see many resembles from the case to real world settings from innovation departments in corporations. Firstly, the problem to solve is a real world challenge and is to be found in other innovation departments in corporations having fulltime professionals working on exactly this specific matter. Secondly, the students will be guided through an innovation process that is guided by experienced professionals, containing deep empirical and theoretical knowledge on innovation and innovation processes. Thirdly, the design of the teams resembles several open innovation structures having individuals from various fields dealing with a specific challenge. In this case the different universities represent the fields. These resembles provides a good comparable format that later can be translated into an innovation-like context. However, it has to be mentioned that the empirical context will have an open-ended outcome as the aim is the facilitate learning of the disciplines of innovation, creativity and biomimetic. This contradicts a conventional innovation process resulting in a specific product or process to be commercialized.

This case offers a suitable fundament for exploring my problem. As the eight interdisciplinary teams all will go through the same process, reading the same curriculum, will be offered the same amount of resources and will be presented to the same methods and approaches, but expectedly have different 'outcomes', I will have the possibility to explore the tension between creativity and innovation up close and how it unfolds in the different groups.

1.7 Thesis structure

This thesis is composed by seven chapters, beginning with the introduction to the field of research, chosen problem areas, research question and empirical context. The second chapter introduces the research design and chosen methods for the study. The chapter serves additionally to explain how the research process evolves and important considerations regarding the quality of the study. The third chapter outlines the theoretical framework for this thesis, which will serve as the theoretical fundament for the fields on creativity and innovation in this study. In the theoretical framework prominent process models for each field will be chosen for further use. This will lead into chapter four which serves to an-

alyse and synthesis chosen process models of creativity and innovation, in order to explore how creative and innovation process models can be combined in a theoretical manner. This chapter brings forth a new explorative theoretical framework for creativity and innovation and the chapter will serve to answer Q1: *how can the creative process and the innovation process be combined theoretically in an integrated explorative framework?* In chapter five, an interpretation of the empirical findings in order to outline how creativity and innovation occurred practically in the empirical context. This chapter serves to answer Q2: *how does the creative exercises occur in relation to the innovation process at 'The Innovation Inspired by Nature Summer School 2013'?* Chapter six will discuss the explorative theoretical from chapter four with the empirical findings from chapter five in order to answer the research question. The last chapter will synthesis the findings and outlines possibilities for further research.

1	2	3	4	5	6	7
Introduction	Research Design & Methods	Theoretical Framework	Analysis Vol. I	Analysis Vol. II	Discussion	Conclusion
Research Question		Creativity Innovation	Q1	Q2	RQ	
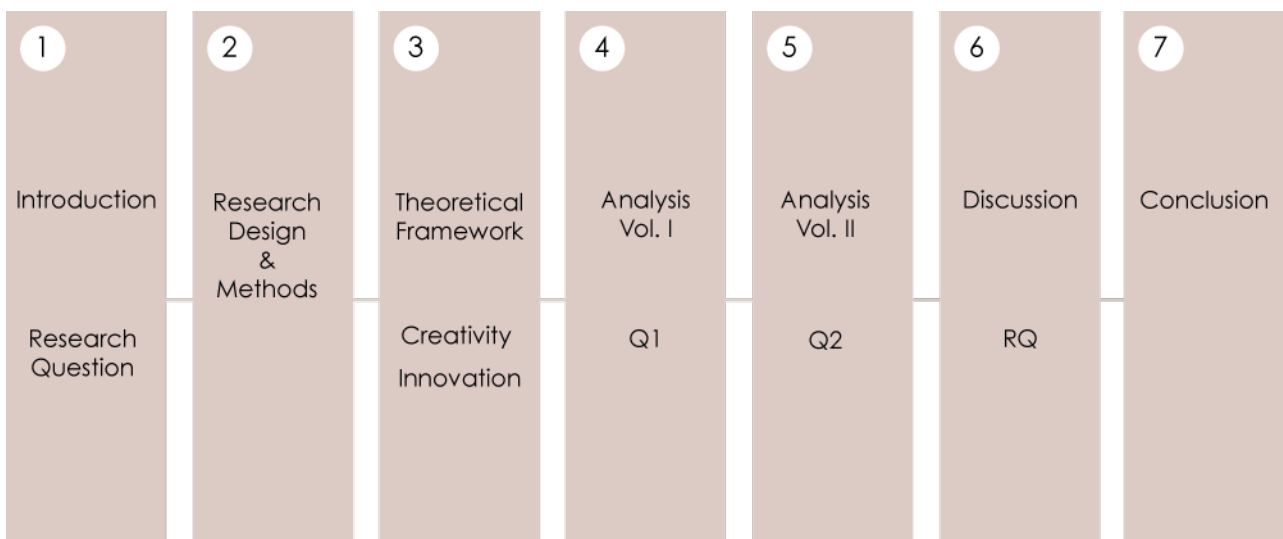
Figure 1 *Thesis structure*
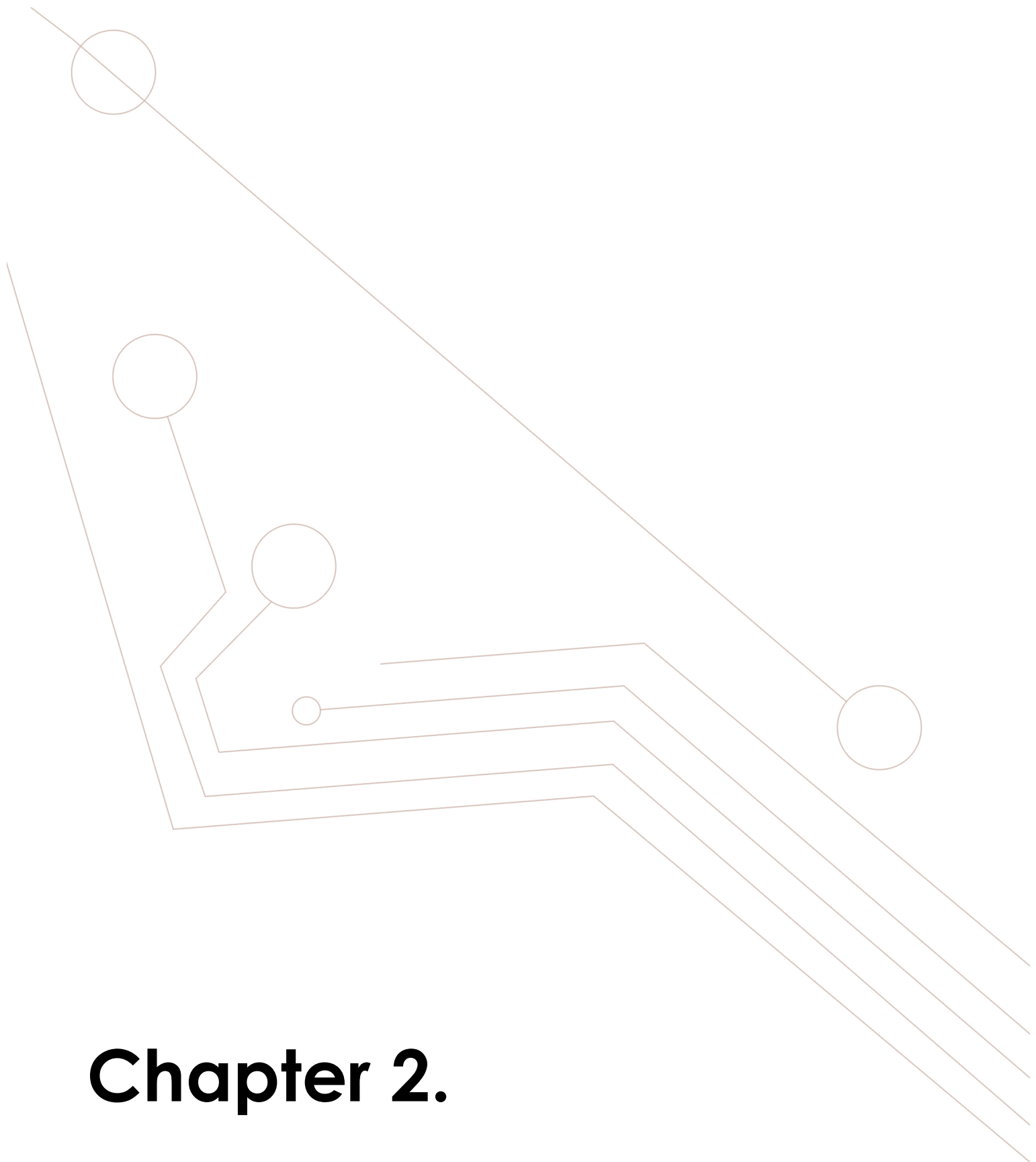
Chapter 2.

Research design

This chapter explains the principal considerations related to research design and methods with the purpose to ensure transparency into the research process and to give an overview of the research approach, collection and treatment of data, limitations, delimitations and critique of chosen method.

2.1 Epistemological considerations

Underlying any form of research there is a philosophy of science that informs us of the nature of the phenomenon examined and the methods for understanding it (Van de Ven 2007). This thesis is no exception where the philosophy of science is to interpret the meanings, logical relations, and consequences of the observational and theoretical statements. With creativity and innovation as the field of this study's core, social constructivism is positioned as the overarching way of reasoning. When researching upon how creativity is influencing and affecting the innovation process, I find it necessary to stress that what is considered creative is constructed by the human subjective worldview, when approaching creativity as something that is novel and useful for a social group. In addition, an innovation process is socially constructed and maintained by humans. Therefore, the research approach for this thesis will be grounded in social constructivism, where it is believed that actors constitute reality (Fuglsang & Olsen 2009). The epistemology of this perspective involves what we experience as truth is neither subjective nor objective but constructed by social interaction (ibid.). Meaning is dominated by contingency and is not universal (ibid.).

This choice of epistemology influence how I conduct my research, as reality will be constructed in the social relations between the implicated and myself when coming to terms on what is considered creative and what is considered stages in an innovation process. As knowledge is not universal according to social constructivism I can simply uncover a shared understanding of reality, which is context dependent, rather than a universal truth.

When creating my repertoire to interpret the nature of things I study and the methods for doing so the hermeneutic approach has to be mentioned. Hermeneutic and social constructivism can be considered as two branches of a united way of reasoning, where reality is based on human interpretation generated by humans (Rendtorff 2003). In the herme-

neutic approach interpretation is based on a specific historical, cultural and societal context (ibid.). Where social constructivism interprets reality as a whole, hermeneutic interprets reality from a subset of the world. This understanding is applied when researching creativity as the historical background and experiences are taken into account when deciding on what is creative and what is not. It is exactly these subjective worldviews from a knowledgeable group that is determining if something is novel, original or useful for a specific domain. In addition, the hermeneutic philosopher Gadamer explains that individuals understand something in a specific context and that in order to understanding something it has to be applied or transferred to practice so others can relate to it (Fuglsang & Bitsch Olsen 2009). This understanding is in line with my approach to study creativity as I have chosen to recognize the creative process as something that ends with externalization before it can be recognized as creative production. It is not enough for the individuals to generate the idea in their mind (ibid.). They have to express it and externalize it one way or the other so others can relate to it.

This theoretical positioning enables an analysis of firstly, how creativity and innovation develops in the social construction by individuals and their subjective worldviews. With the overarching social constructivist perspective this study itself is "simply" a construction created between theory, empirical data and the present interpretation hereof. It is the purpose of its method to make the construction apparent to the reader through reflection and transparency.

2.2 Research process

In order to explore my research question I have divided my research process in six steps. To clarify and create transparency the research process is explained with the effects it had on my study.
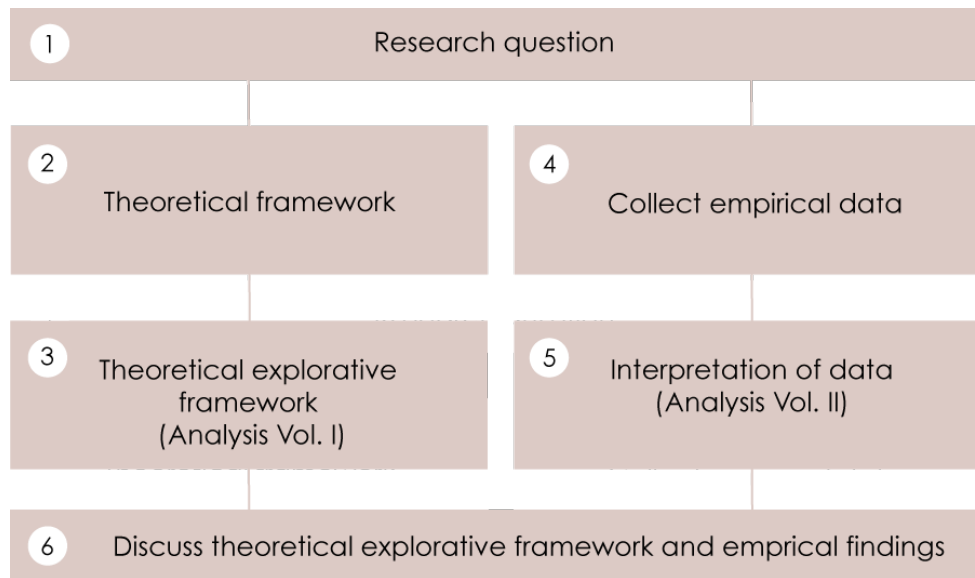
Figure 2 *Research process*

The research question is point of departure, *step 1*, and will be guiding my research process into different necessary steps. The second step was to create a theoretical framework where prominent models and theories could be identified, and to get a theoretical overview of the fields. This led me into the third step where a theoretical explorative framework is created to explore how creativity and innovation can be combined in a theoretical manner. In step four I collected my empirical data to explore practical experience with the fields. This led me into step five where I interpreted my empirical data. It is important to mention that I conducted the steps in this order, as the theoretical understanding undeniably influences how I collect and interpret the data. It will both influence what I see and finds important further in my research. In the last step I will challenge the explorative theoretical framework with my empirical findings to advance the understanding of correlation between creativity and innovation.

2.3 Methodology

In order to answer the research question this thesis will approach the problem with inspiration from Van de Ven & Roger's (1988) approach for studying innovation processes in combination with Van de Ven's (2007) *Engaged Scholarship.* Engaged Scholarship is a participatory form of research to study social complex problems. When conducting this form of inquiry there is an underlying assumption that to understand the field, researchers themselves must enact in the field and reflect upon it by engaging in it (Steyaert 2011).

Both Van de Ven & Rogers (1988) and Van de Ven (2007) suggest a process study, which is useful for researching how things develop and unfolds over time. This type of study requires data from real-time field studies of a process. This research design is built on both approaches, though altered to explore the problem on how creativity affects and influence the innovation process.

While purely deductive studies are theory driven, where operational concepts are developed and tested with data (Goetz & LeCompte 2008), induction is opposite starting with empirical discovery that are translated into theoretical concepts (ibid.). The mode of inquiry for this study is neither purely inductive nor deductive as I have developed operational concepts grounded in theory to focus the study, rather than to test if the theory holds. The theory will be used to recognize certain important process elements in the study.

2.3.1 Case study

The empirical study will consist of a single case study, where the summer school course 'Innovation Inspired by Nature 2013' has been chosen. Case studies are useful for pursuing "how" and "why" questions, and it can focus the study to a specific context (Simon, Sohal & Brown 1996). The choice of case has been made as it offers a suitable fundament to research on how creativity influences the innovation process. Firstly, because an actual innovation process is to take place. Secondly, the elements of creativity will be implemented with methods and exercises incorporated into the process. Even though it is a rather 'constructed' case I can make sure that essentials for my study will be present in a

form for me to study it. In addition, the case as the empirical fundament is essential for gaining new knowledge for a problem that has been shown to be unsolvable in a theoretical manner (ibid.). The case will serve to gain a deep understanding on how creativity is influencing innovation in this specific context with its specific characteristics (see pp. 11-12). The results will only be generalizable to other cases with the same setup. When it comes to demographics the sample can be seen as rather homogeneous, as most of the participating students are living and studying in Copenhagen and will be in the range of 20-30 years. Although, the sample is rather heterogeneous as the students comes from very different domains and is speaking different languages and holds different kinds of knowledgeable backgrounds and understandings (Appx. 3).

As mentioned there are four participating companies and the groups were distributed equally amongst the case companies with two groups working with one case each. Before the course started I had selected one group for each case, to get a broad perspective with four different innovation challenges in four different groups. Due to challenges in the practical execution of the observations (see pp. 22-23) I had to change this decision, which resulted in me observing team A and team B, that were to solve the innovation challenge proposed by company Y (Appx. 5) and team C and team D, that were to solve the innovation challenge proposed by company x (Appx. 6).

2.3.2 Design of process study

A case study can incorporate several different methods (Simon, Sohal & Brown 1996), and this study will take the form of a process study with the use of observations. Process research is a type of data gathering and analysis that seeks to determine time-ordered sequences of a set of events (Van de Ven & Rogers 1988). Such a process study can be used to identify either *what* or *how* a process unfolds. Van de Ven suggests a method to advance the understanding of a process being studied in real-time while an innovation develops from initial concept to implemented reality. With inspiration from his framework I use three of his proposed requirements to undertake research on the process of change in general, and on the innovation process in particular; *concepts to focus the object being studied, systematic method for observing change in the object, method for identifying*

patterns in the raw data. The process study will allow me to treat my empirical material as 'it is' and to let it speak its own language.

Process concepts

When observing the process a set of concepts has to be in place for examination (Van de Ven & Rogers 1988). I will operationalize the understanding of creativity and innovation, in order to recognize these elements in the study. When a change is happening in one of these concepts it will represent an *event*. According to Van de Ven & Rogers (1988), one can define *change* as an empirical observation of *difference* in *time* on one or more *dimensions* of an *entity*. So practically I will study how the following process concepts change.

Operational understanding of creativity

According to Amabile (1996a; 1996), when investigating creativity researchers are in need for an operational understanding of creativity in order to recognize or measure it. In this thesis the creative process are in focus, but Amabile (1996) argues that an operational definition of such is not yet possible. Instead researchers have to rely on the outcome/response/product of these creative thought processes, which can be observed (ibid.). Therefore, creative exercises (methods, tools and ideation) that lead to a divergent or convergent response will be used as the operational measure of creativity in this thesis. When recognizing creative exercises as elements of creative production I will be able to observe when the creative production is happening. In addition, the divergent and convergent thinking can be observed by the amount and type of ideas that follows the specific exercise that is performed. If the exercise leads to many and remote ideas it will show divergence. If the exercise provides selection and validation of ideas it will show convergence. The change that I will be able to observe is the quantity and quality of the idea/ideas that are developed from the exercises and weather or not the exercise generates convergence and/or divergence. These exercises will give me the possibility to observe when the creative process is going on and how change will occur as the course develops.

Operational understanding of innovation

As mentioned, the empirical case limits this study to look at the process and not the outcome of such a process. As the general way of perceiving innovation encompasses a product or service being implemented there is a need of an operational definition, to acknowledge that a multi-stage innovation process is happening. From the theoretical definition it is clear that innovation happens through a process and I will look at the stages that the students are going through when acknowledging innovation. Practically this will be the phases that the students are working or guided through. A part of the theoretical definition encompasses new or improved products, but with the focus on the process and characteristics of the case there will be no evaluation weather or not the outcome is new or improved. To pinpoint the different types of stages the students can possible go through, when going through an innovation process from A to B, I will draw on the recognized stages from innovation literature. Regardless of what order they happen in I recognize it as an element or stage of the innovation process if they match the characteristics from the literature. The chosen 'labels' for the stages are developed from The Stage Gate Model and The Innovation Process model that will be explain in detail at pp. 44-47. Although, I will strive to be open if there happens another changes in the stage of the innovation process that does not fit the stages from innovation literature. The stages developed from innovation theory are as followed:

> ***Search:*** To identify this stage I will search for behaviour towards searching for potential signals, ideas or problems that can be addresses further in the innovation process.
>
> ***Select:*** When identifying the selecting phase I will look for behaviour regarding selecting which signals, ideas or problems to work with in the process.
>
> ***Testing and validation:*** This stage consists of performance where an idea or problem is being tested, evaluated or validated to understand the potential value of the idea or to explore if it meets specific requirements.
>
> ***Develop:*** To pinpoint this stage I will search for performance in developing one or more ideas on a deeper level. This could be anything from detailed sketches to complex prototyping.

Due to expectations of large amount of data I have developed a personal observation guide as a systematic method for observing the concepts and to make sure that I focus my research. There has been developed both an observation guide for the creative process concepts (Appx. 7) and the innovation process concepts (Appx. 8). This tool will be extremely helpful when collecting data and later for the analysis of this.

Observation

With the empirical case I have access to observe the students for three weeks during the entire process from when they meet for the very first time until they finish the course the last day. I can therefore observe present-day events to identify how the process develops (Van de Ven & Rogers 1998). As I am there for three weeks I will also be able to observe change over time, which is necessary to see what kind of change occurred (ibid.). My developed process concepts will be used to focus the observations to narrow the scope, as many other factors will be present during the three weeks. To focus my study I observed four of the eight groups, representing two groups from two of the cases that were a part of the summer school. As mentioned this was not the initial plan. When I started observing I quickly discovered that the physical space was a limitation to my study, as two of the selected groups were situated in workstations where I had to open a door to enter their workspace. This was a constant interruption to their work and my presences interfered strongly. I consequently chose to observe the groups that were situated in more open spaces where there were traffic, noise and a dynamic environment. These spaces allowed me to 'meld' into their surroundings so they felt comfortable by me being there when working. For the groups I became such a natural part of their work, and I was on more occasions asked to join them when they were to do an exercise. For some of the groups, friendship started to evolve and this relaxed relationship gave in-depth knowledge, as they felt comfortable discussing their work with me.

The observations were documented through personal written field notes that have been transcribed in chronological order (Appx. 9). In addition, I have been using video recording at a special occasion, where it was not possible to conduct observations (Appx. 10). Lastly, pictures have been useful to supplement the observations when documenting the exercises, due to the challenge of keeping up with all the groups at once. Throughout the

observation process around 1000 pictures were taken and a selection of the pictures is presented in themes for each group (Appx. 11).

To crate transparency it is important to note that I am not only taking part as an observer, but I have also been part of the summer school team as the evaluator of the course. I am engaged in the summer school on a deeper level as I have been sitting in to meetings in the planning process and I followed up after the course has ended, by doing the evaluation. This engaged role has both its benefits and disadvantages. The greatest benefit when being engaged in the process of making the summer school lies in the fact that I through the process have built relationships with the administrators, facilitators and professors involved in the course. In addition, I have had the possibility to discuss this thesis with them and acquired knowledgeable advices on how to approach this specific case. When being involved in the study that I am researching upon, there will be challenges as there is the chance of being 'too' involved and unable to create a distance when I am performing the role as an observer and evaluator. To overcome this challenge Ball and Ormerod (2000) suggest to spend time in the end of everyday to reflect on how the researcher is approaching the case and how the observations is conducted in the role of the observer. This reflection time was useful to take one step back and consciousnessly reflect on my own awareness. However, it has to be mentioned that with the epistemological point of departure I, as a researcher, cannot distance myself entirely from my own understandings of the world.

2.3.3 Data analysis

When obtaining systematic observations of the process over time, an overwhelming amount of data is to be expected. A method for organizing this raw qualitative data is necessary before processual patterns can be found. With inspiration from Van de Ven & Rogers (1988) I have developed a method for arranging the data in two steps;

1) *Identifying creative process concepts and translating them into trends. As I expect to find many concepts and trends I will chose the most essential trends.*
2) *Coding the trends into conceptual innovation tracks.*

Practically I will categorize exercises and activities performed in four groups entitled *brainstorm, evaluation, discussion & other* and *prototyping*. Figure 3 illustrates how the categorise are differentiated. If it was possible to observe a result for e.g. a brainstorming session, the result is placed in the middle. As they generate many different ideas, problems and criteria these have been condensed into themes. To differentiate whether they are developing ideas or problems, the stroke of the theme are given a colour illustrating the category.
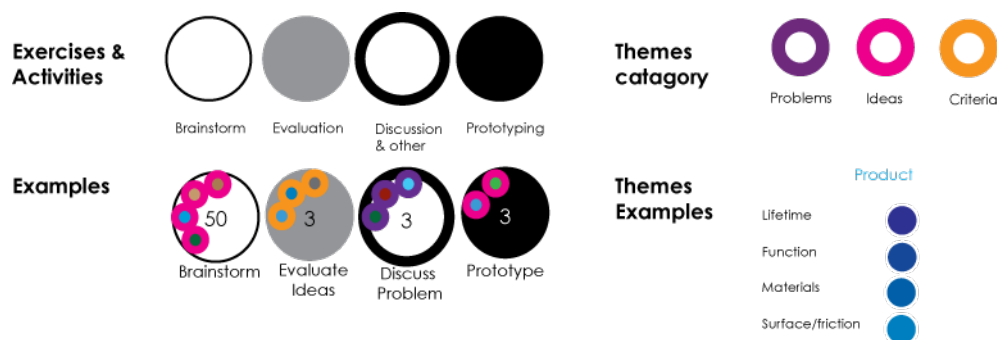
Figure 3 *Explanation of elements in data analysis*

In regards to generating the tracks for the innovation process model, the four stages *search, select, test & validate* and *develop will be coded into four different colours as showed in figure 4.*
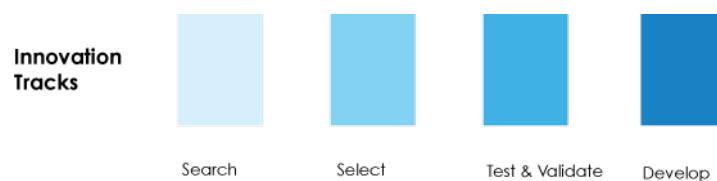
Figure 4 *Explanation of innovation tracks*

In this way I can analyse how the creativity trends correlates with the innovation tracks at an empirical level. The purpose of the data analysis is to create an analytical tool that visually can give an overview of their developing processes. It will show what type of exercise or behaviour they are performing, and when they are performing it. The analysis will be my interpretation of their process and I will use the tool to reduce the complexity, by conceptualizing exercises and tracks at an abstract level. There are both benefits and limitations as a consequence to this type of data analysis. This method will provide a visual

overview and possibility to compare the processes across the four groups. In addition it will reduce complexity with the conceptualization of the many exercised performed. The tool will make it possible to detect convergence and divergence in the process when performing an exercise, as the tool will clarify both the number of generated ideas or problems and the different themes that they are operating within. It will also be possible to make a backtracking of ideas and problems, as the colour coded themes shows where the element came from. However, there are also limitations when having this kind of simplified tool. The tool cannot detect how much time they spend on the exercise, or how detailed the output was. It cannot explain if the students' interpretation of a theme changes within the process. In addition, the tool won't explain if something is happening in their environment such as lectures, deadlines, comments etc. Richness will be lost when conceptualizing the process in this way. In the analysis I will strive to restore some of the lost richness by adding quotes and observations notes to support the identified trends and tracks.

2.4 Reliability and validity

Reliability is the extent to which measures are repeatable, under different conditions, in different contexts with various method approaches (Drost 2011). According to Van de Ven (2007), the reliability of process studies are evaluated on their potential generality, which depends on their versatility. The generality of a narrative explanation are not evaluated on uniformity and consistency, but rather on how versatile it is (ibid.). In what degree it can encompass a broad domain of development patterns without modifying its essential character. The broader the domain, the greater the variety of cases, contexts, events, and patterns to which the theory can be applied. In my case I generate a process that is broad in terms of domains and in that sense the knowledge can be applied in other areas. Although, as there is only one case and context it can be seen as rather narrow and potentially with lover generality.

The validity refers to the meaningfulness of research components (Drost 2011). In other words, is the research measuring what is intended. The context dependence in this thesis is a challenge that occurs in many studies conducted in the social science, and to cope with this challenge it is important to create transparency by being explicit and reflective

about methods deployed through the research in order to ensure validity. This transparency is created in many ways when outlaying how concepts are being operationalized, how the research process developed, the implications of the study amongst other reflections and decisions made in this study.

2.5 Methodological delimitations

This study will be delimited to examination of factors and elements that are perceived to have relevance when exploring the creative process and the innovation process. These have been operationalized into process concept, to set boundaries in order to control the range of study. Consequently, this study will explore the creative exercises that are performed during the process and the innovation tracks, which they are developing through. Thus, this study will not have the possibility to explore the outcome of the process, as it is the 'path' to developing an outcome that will be in focus. This delimitation is necessary due to the choice of methods, which require an object to be studied in real time. This study is also delimited to my interpretation, as the chosen method is set on observations. If the participants' interpretation should have been included, interviews would have been necessary. Even though, the chosen case has an interesting aspect of interdisciplinarity, this aspect has been delimited to create scope. The focus is set on their activities and not how the different academic backgrounds are functioning together in the process. This study is context dependent, with the choice of exploring one case in-depth. The case has with specific characteristics, which makes it less reliable.
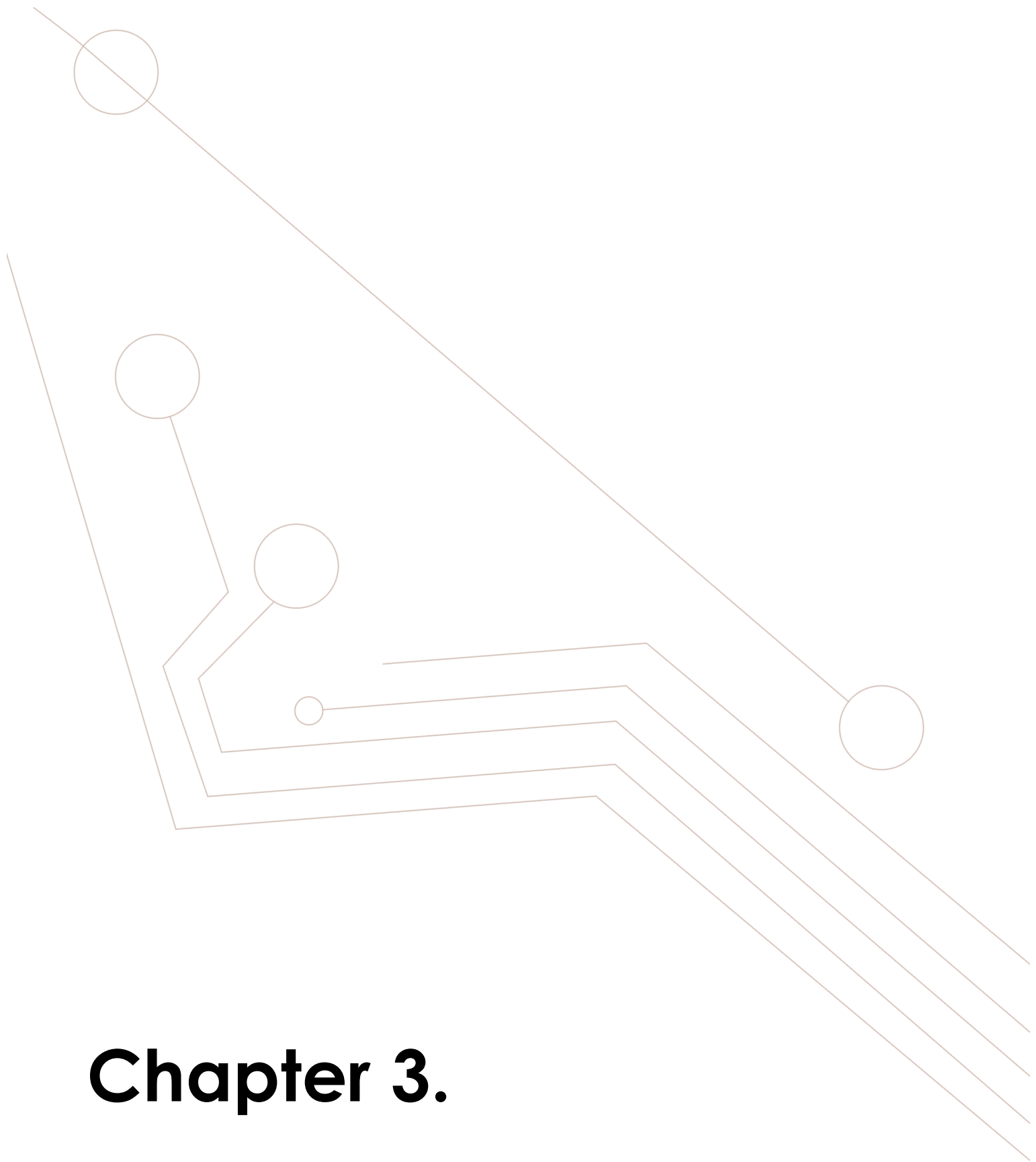
Chapter 3.

Theoretical framework

This chapter has the purpose of outlaying how researchers currently perceive the concept of creativity and innovation and how their respective process unfolds. This will be done through two separate reviews of creativity and innovation with a focus on the processual understanding of the prominent models and theories from the fields. Even though the two disciplines have emerged in two separate fields with its own language and symbols, I have constructed categorise across the fields for the sake of making a comparison in this chapter:
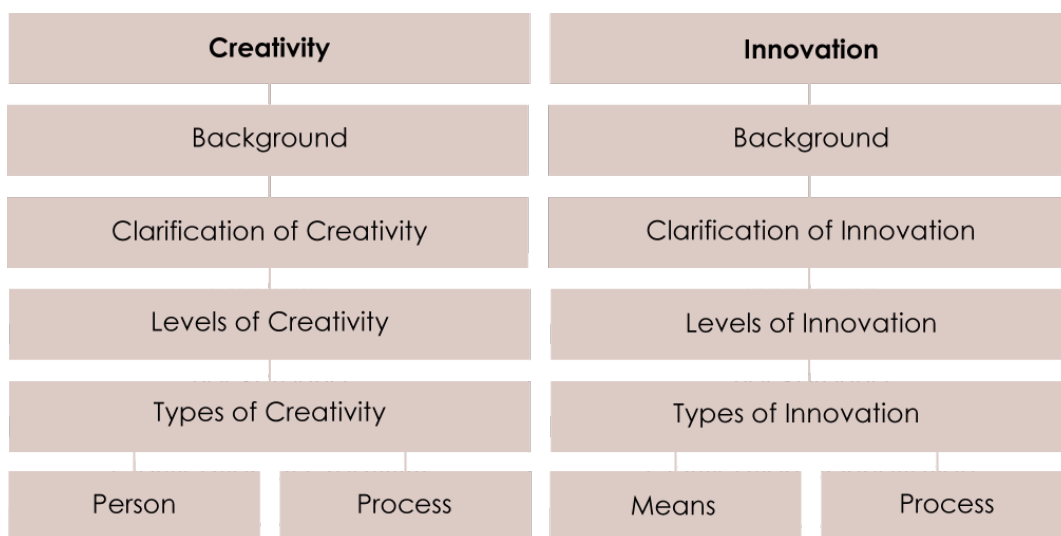
Figure 5 *Theoretical framework structure*

The figure illustrates how categories will serve as a guide through this chapter. However, not all categories will be explained in depth equally. In both the *creativity* part and the *Innovation* part there will be a strong focus on process models. *Background, clarification, level, types and person/means* will merely build the essential fundament in order to comprehend the respective process theories. In addition, there will be a deeper level of detailed description in the *creativity* part due to the scope and focus on creativity.

In order to be comprehensive when conducting the review there has been searched on Business Source Complete, ScienceDirect, SAGE Journals/publications, and Google Scholar amongst other academic databases. In addition, various experts and professionals with creativity and innovation have been contacted in order include up-to-date research from the field.

3.1 Creativity

3.1.1 Background

Although, we can find traces of efforts to grasp the concept of creativity leading all the way back to pre-Christian time, the first systematic and psychological study of creativity was undertaken by Galton in 1869, with his focus on the creative genius. This line of investigation remained prevalent into the 1920s, when the research shifted focus to the investigation of intelligence. However, many researchers consider The 1950 American Psychological Association presidential address by J.P. Guilford (1950) to be the starting point for increased psychological research of the phenomenon creativity, with his examination of the limitations of intelligence test and his investigation of *Divergent Thinking* (Barron 1988; Isaksen 1987; Rhodes 1961). This period followed by great amounts of research with the effort to test and measure creativity, in order to outline its characteristics and possibilities for enhancement. In the 1980s and 1990s creativity research was focused on the social psychology framework, recognising social structures for individual creativity (Rhyammar & Brolin 1999; Jeffrey & Craft 2001). Thus, leading to research of the organizational climate serving to stimulate creativity (Ekvall 1991; Amabile 1983) and the role of the context became further emphasized in the organizational domain.

Despite the six decades of increased research there are still many unanswered questions in the field of inquiry, hence the elusive and complex nature of creativity. This complexity has been strongly apparent in researchers effort to define creativity, which has led to a great number of diverse and even contradicting definitions of the concept. A recent study by Kampylis & Valtanen (2010) found 42 explicit definitions and 120 collocations.

3.1.2 Clarification of creativity

Creativity researchers can be grouped into two major traditions of *the individualist approach (psychology)* and *the sociocultural approach (sociology)* (Sawyer 2012). In this thesis a composition of the *individualist approach* and the *sociocultural approach* will serve as a fundament when understanding creativity.

The individualist approach defines creativity as new mental combinations that are expressed in the world (Sawyer 2012). It has a focus on individuals and the structures and processes referring to the individual (ibid.). Here creativity is understood as somewhat novel and original occurring from combinations of ideas or concepts unnoticed from that specific individual, but it has to be express in order to be shared and understood (ibid.). From this approach an idea is characterized as creative as long as it is perceived novel and creative to the individual that develops the idea. With a composition of the sociocultural approach, single individual novelty is rejected hence the social scope where *"Creativity is the generation of a product that is judged to be novel and also to be appropriate, useful, or valuable by a suitably knowledgeable social group"* (Sawyer 2012). In addition, social novelty is not enough. The creation has to be *appropriate (useful, valuable)* in order to be viewed as creative. When elaborating on the approach the term *product* is here understood as both tangible and intangible (Kampylis & Valtanen 2010). With this approach it is clear for whom the product shall be novel and appropriate; a suitable knowledgeable group that has the expertise and knowhow to judge whether the product is truly creative. However, the definition has a weakness when it comes to the question of "How original/novel/unique is original/novel/unique enough?" which is subjectively decided by the judges in the social group.

As mentioned, for the sake of the thesis an understanding of creativity in both a psychological and sociological way is utilized. As this thesis serves to explore the process of creativity and innovation, the dynamics that constitute this process to be taken into account. Thus, leaving cognitive idea generation processes and psychological doing open for exploration.

3.1.3 Levels of creativity

When speaking of how we understand creativity, the level for creative production needs to be considered as well. In order to understand the concept of creativity it is important to understand that there exist different levels of which diverse individuals generate creative products or ideas (Ward & Kolomyts 2001). Big-C and little-c creativity is a common way of differentiating the creative acts of individuals (Richards, 2001). Big-C Creativity (eminent creativity) refers to unambiguous examples of creative expression. In contrast, little-c crea-

tivity focuses on creativity of everyday life (Richards 2007). Whereas Big-C creativity crafts a major contribution in a domain for a new discovery to occur, little-c creativity is a novel approach to a problem that is interesting and useful, but without a major impact in a field. Kaufman & Beghetto (2009) expanded this distinction of creativity with mini-c and Pro-c. Pro-c is defined as the level between Big-C and little-c, where the individual has developed knowledge, skills and motivation to produce creative advancement, but not as revolutionizing as Big-C creativity. Mini-c apprehends that individuals without domain knowledge create their own conception of the world, which can lead to little-c or Big-c creative production over time.

3.1.4 Types of creativity

When pursuing to understand creativity it also important to take into account that creativity exist in various types or forms. The four P's is in many ways a system approach towards understanding creativity, when you see creative products as the outcome of creative processes engaged with creative persons, which is supported by the creative environment (press) (Rhodes 1961). Traditionally the 'four P's' refereed to *process, product, person (or personality) or place (or press),* but have later been extended with *potential* and *persuasion* (Simonton 1990; Runco 2003).

Person covers cognitive abilities, biological traits, biographical traits and personological traits (Rhodes 1961). *Process* depicts the mental processes functioning in creating ideas. This process includes preparation, incubation, illumination and verification inspired by Wallas' framework on the process (Wallas 1926). *Product* refers to ideas both tangible and intangible. *Press* includes the connection between the individual and its surrounding environment.

For the sake of this thesis, the author has chosen to get a deeper understanding and exploring the process of creativity, deliberately bypassing *product* and *press*. Yet, some of the *person* understandings have to be taken into account as the creativity researcher have emerged in the field of psychology, resulting in the fact that the creative process draws on cognitive understandings and learning from the field of creative psychology.

3.1.5 The creative person

Features
The examination of the traits, skills, qualities and other features, which separate highly creative individuals from less creative individuals, has been extensively researched within the field of creativity, with prominent researchers such as Guilford (1970), Torrance (1974), MacKinnon (1962). Through this examination it has been acknowledge, that personality influences creativity by lowering behavioural limitations (Feist 1998, 1999). Given assemblages of personality traits function to lower the barriers of creative behaviour, by making creativity occur more often (Feist 1998; Rosenburg 1998). Through the focus on determining and measuring the creative personality, in perceived creative individuals, researchers have found personality characteristics of such to constitute elements as, *awareness of their creativity, originality, independence, risk taking, personal energy, curiosity, humour, attraction to complexity and novelty, artistic sense, open-mindedness, need for privacy and heightened perception* (Davis 1992). In addition, Feist (1998) found that these individuals tend to be *autonomous, introverted, open to new experience, norm doubting, self-confident, self-accepting, driven, ambitious, dominant, hostile and impulsive.*

With in this field some researchers have examined the features that incline individuals to be successfully creative in the organizational context. Amabile (1988) has investigated which individual factors that contribute to creative accomplishment in the workplace and found various personality traits such as *persistence, curiosity and energy,* and features as *self-motivation, special cognitive abilities, risk-orientation, expertise in the area, qualities of the group, diverse experience, social skill, brilliance and naiveté*. The features for the ideal creative individual are different with the stronger focus on expertise and social skills. The only direct overlap we see is the curiosity, energy and risk-taking mind and this emphasis this unstageable phenomenon of creativity.

Cognitive abilities
Besides having an understanding of what kind of features the creative person ideally should have, there is a general consensus in the field of creativity that certain cognitive processes and abilities are important for creative production. Divergent thinking serves great importance in creative problem solving, as divergent thinking is understood as think-

ing that goes off in different directions and generates a spectrum of ideas (Russ & Fiorelli 2010). It is the open-ended generation of ideas in response to some kind of task or stimulus. Guilford (1968) described divergent thinking as the process by which ideas are produced and distinguished thinking that moves in divergent directions, and thus may result in more original ideas. Divergent thinking can also be explained through Mednick's (1962) Remote Associations Theory, which describes how differences at the level of information processing affect the creative ability. In the human neuronal network, concepts (words, objects, elements etc.) are associated to one another depending on the remoteness of the concepts. Mednick argues, that less creative people have the ability to activate many close related concepts, where highly creative people will activate both the close and the remote associated concepts. It is in the remote associations that creative and original solutions are created.

In the creative production *convergent thinking* serves great importance when evaluating the ideas and thus determining if the idea is of any value (Sawyer 2012). Convergent thinking can be seen as the critical thinking stage that follows the divergent thinking stage (ibid.). Here, the idea is evaluated from varies parameters build on a knowledgeable fundament. Many studies reveal that evaluation and revision of ideas contribute to creativity by leading to greater originality and impact. The ability to accurately judge the creative potential of an idea is essential to being an effective creator.

Knowledge

Cognitive abilities and special creative features do not solely explain what we know about creativity. Researchers have been exploring whether or not creativity can be seen as either a set of *domain-general* skills that can be applied broadly, like a special kind of intelligence and personality trait across many domains, or as *domain-specific* skills related to expertise in a specific domain (e.g. Amabile 1983, 1996; Baer 1993; Gruber & Davis 1988; Kaufmann & Sternberg 2010; Runco 1989a; Silvia, Kaufman & Pretz 2009). The two contradicting approaches hold different predictions regarding the creative performance. Currently, there is a seemingly consensus that creativity is domain-specific and for the sake of this thesis this understanding is conveyed, as the evidence towards this approach is rather substantial. Researchers even found that divergent thinking is domain specific (Sternberg 1999).

To clarify, a domain can be defined as a sphere of human accomplishment like different academic disciplines with different mental activities (Sawyer 2012). In addition, it can be seen as a field with its own symbolic rules and procedures (Csikszentmihalyi 1996). A sphere with its own principles (Gelman & Brenneman 1994), and representation of knowledge such as language, numbers and modes of reasoning (Karmiloff-Smith 1992).

3.2 The creative process

Roughly, theorists support two different perspectives on the creative process; *Idealist theorist* and *Action theorists* (Sawyer 2012). Idealist theorists argue that once you have formed the creative idea in your head the process is complete (ibid.). On the contrary, action theorists emphasise the importance of the creative execution, by bringing the idea to life through actual work with materials and so forth. In this thesis the focus will be on the action approach as it provides a possibility to be observed in real time, when understanding the creative process as something that happens over time working with the idea. When investigating the creative process researchers have found consensus in terms of dividing the creative process in stages consisting of minimum a divergent and a convergent phase (Sawyer 2012).

When selecting which process theories to be utilized in this thesis an exploration through the most prominent models have been investigated. In the end Sawyer's *Eight Stages of the Creative Process* and Amabile's *Componential Model and the Creative Process* was chosen. Sawyer was selected, hence his model consists of many of the most prominent creative models in the field from both practitioners and scholars. In addition, his theory emphasis the action approach which is more observable. Amabile's model is also an action approach, and she is one of the most acknowledge researchers studying creativity in organizational contexts. In addition, she draws on the features that I found to be important in literature, when combining her theory with the componential framework. Lastly, her model was chosen due to her underlying assumption that everyone can generate some level of creative production, which is useful when investigating students rather than artists and alike.

3.2.1 The eight stages of he creative process

Sawyer (2012) is one of the researchers that have given his interpretation of the creative process with an integration of various prominent models suggested by; Wallas (1926), Isaksen, Dorval & Treffinger (2000), Bransford & Stein (1984), Sternberg (2006), Burnard, Craft & Grainger (2006), QCA (2005), Gordon (1961), Scott et al. (2004) and Kelly (2001). The model is built on the consensus of creativity not being a unitary mental process, but rather a result from many of such process each associated with one of eight stages.

Step 1: Find the problem
The first step in the process begins with an identification and formulation of a problem in a way that can lead to a creative outcome (Sawyer 2012; Ward & Kolomyst 2010; Jay & Perkins 1997). Most creativity occurs when people are working on an *ill-defined problem*, because it cannot be solved by past experience, the problem statement and the goal, there may be many solutions to the problem and there are similarly many paths to a solution (Mumford et al. 2003). Solving ill-defined problems requires high degree of *divergent thinking* and the skills of *problem finding* is of great importance (Sawyer 2012).

Step 2: Acquire knowledge
Once the problem is defined and formulated, relevant knowledge needs to be acquired concerning the problem (Sawyer 2012). A learning of prior work, symbols and conventions existing in the problem domain needs to be internalized, before one can combine prior learning and generate new creative combinations (ibid.). Research have shown that individuals spend 10 years of study in a domain before one generate major contributions (Big-C creativity), and this shows the importance of the familiarness of domain (Gardner 1993; Bryan & Harter 1899).

Step 3: Gather related information
When the problem is defined and one is mastering the domain, the third stage is to gather potentially related information from a wide variety of inspirational sources, whilst being alert to opportunities to apply unrelated information, that may be not domain relevant, to the problem (Sawyer 2012). For creativity to happen one needs to be able to pinpoint el-

ements and opportunities in the environment that can be linked to the problem at hand (Sawyer 2012; Perkins 1981).

Step 4: Incubation

The fourth stage is absorbing and processing the information and knowledge that have been acquired in an unconscious process, which creativity researchers label as incubation (Sawyer 2012). Incubation encompasses a temporary break or interruption from the problem at hand, forcing the mind to go other places and distract one from the problem (Smith 2003). Simon (1966) describes incubation as a process of selective forgetting. Information gained during attempts to solve a problem is retained in the long-term memory (ibid.). When the individual return to the problem, the individual can retrieve from the stored memory (ibid).

Step 5: Generating ideas

The fifth stage involves generating a large variety of ideas, which Sawyer (2012) explains through standard cognitive processes and structures. Sawyer describes the generation of ideas as insights that can be sparked of previous experience and acquired knowledge, by drawing and combining prior knowledge with new information (Sawyer 2012). As mentioned earlier, the generation of ideas can be described by Mednick's (1962) association model and Guilford's (1968) divergent thinking process, leading to creative and original solutions.

When dealing with cognitive process it is undeniable that fixation can occur. Fixation can be defined as an element that hinder or block the cognitive processing (Smith 2003). When fixated individuals are not capable of solving problems, performing divergent thinking or even remembering well-learned knowledge (ibid). According to Smith (2003), there are three reasons for occurrence of fixation: *typical knowledge, implicit assumptions* and *recent experience.* In short, the fixation occurs when you take the same approach when solving a problem, unconsciously makes implicit assumptions when solving problems and use routines to solve series of similar problems (ibid). In this way, former knowledge used inappropriately can fixate your way of thinking when blocking your thoughts.

Step 6: Combine ideas

In this phase ideas are combined in unexpected ways. Sawyer (2012) argues that creativity happen when ideas are combined together. This combination can occur in several ways. *Cross-fertilization* is one way of making the combination happen (Sawyer 2012). The idea is that if individuals work in several projects at one time, information is incubated whilst working on other projects. In addition, when switching fields, individuals are introduced to new techniques or modes of reasoning from another domain. This multidisciplinary insight refers to *analogical thinking,* where analogies between distinct domains allow individuals to perceive patterns in new ways (Simonoto 1988). Many researchers label this as *conceptual combinations*, where two concepts are combined in a new form. By using analogies features from one concept can be transferred to another.

Step 7: Select the best ideas

Once the ideas have been generated and/or combined a selection of ideas is performed when applying relevant criteria used for evaluation (Sawyer 2012). Sawyer explains this stage as a critical stage drawing on the notion of *convergent thinking*. This evaluation process is based on knowledge from the domain regarding novelty and appropriateness (Bink & Marsh 2000; Csikszentmihalyi & Sawyer 1995). For different creative work there exists different evaluation criteria relevant to the solution, and there will always be a tension between evaluating what is appropriate and what is original (Sawyer 2012). Evaluation and revision contribute directly to creativity by leading to greater originality (Lonergan et al. 2004).

Step 8: Externalize the idea

In this phase externalization of the ideas happens using materials and representations (Sawyer 2012). Researchers have found many examples of externalization being essential for creativity (John-Steiner 1985; Larkin & Simon 1987; Verstijnen 1997; Meyer 1989). Conjointly these studies showed that individuals utilize externalization in their creative process to improve their problem solving, by shaping and altering the idea physically. Even though, this stage is placed in the end of the process, researchers found that creative do not postpone externalization to the final stage, but uses it as a part of their problem-solving work throughout the process (Sawyer 2012).

3.2.2 The componential framework and the creative process

Amabile (1996) explains the creative process by encompassing her *Componential Theory on Creativity,* consisting of necessary elements for creative production in any given domain; *Domain-relevant skills, Creativity relevant skills* and *Task Motivation.*

Domain-relevant skills can be considered as the fundamental element for any given performance in a domain (Amabile 1996). It is the foundation for all creative work (Amabile 1997). It can be perceived as a set of cognitive pathways that is followed, when solving a given problem or task (ibid.). The component includes factual knowledge, technical skills and special talents in the domain (Amabile1996.). *Creativity-relevant skills* include cognitive style, application of heuristics for exploration of new cognitive pathways and working style (ibid.). This creative thinking depends on personality traits connected to independence, self-discipline, risk-taking, tolerance for ambiguity etc. (Amabile 1997). The last component *task motivation* includes motivational variables that determinate the individuals approach to a given task (Amabile 1996). Although, the two skill components define what a person is capable of doing in a given domain, task motivation determines what a person actually *will* do (Amabile 1997). The former depends on his or her level of expertise and creative-relevant skills, but the task motivation determines to what extent one will engage the expertise and creative-relevant skills in a creative process (ibid.).

Step 1: Problem or task presentation
The first step is initiated with a task being engaged in or the problem to be solved. Here task-motivation is essential, hence if the individual has high intrinsic interest in the problem he or she will engage in the process. In addition, Amabile notes that when finding the problem there is a larger chance of achieving task motivation, than if the problem is presented beforehand (Amabile 1996).

Step 2: Preparation
The second stage is considered preparatory to the actual generation of responses or solutions, when gathering information relevant to the problem or task of the domain in question. Therefore, domain-relevant skills become essential, and Amabile stresses that this

learning stage will be stretched if the individual does not possess domain-relevant skills at this point (Amabile 1996).

Step 3: Response generation
At the third stage the level of novelty of the product or response is determined. At this point, individuals create response possibilities when searching through pathways and exploring relevant features of the environment. Here creativity-relevant skills and task motivation are essential as, the creativity relevant skills will determine how far one can go when diverging and task motivation will determine the willingness to play, open-mindedness and risk-taking (Amabile 1996).

Step 4: Response validation
In step four the validation of the responses will be performed by utilizing domain-relevant skills and techniques for analysis and evaluation. The response possibility is tested for appropriateness, usefulness and value through assessments criteria for in the given domain. This stage is what many creativity researchers consider a convergent stage (Amabile 1996).

Step 5: Outcome
On the basis of the test at stage four a decision-making must be carried out. If the response has been tested and accepted the process will terminate. If not, Amabile suggest that iteration will happen leading back to the first stage where the problem is again proposed (Amabile 1996).

3.4 Innovation

3.4.1 Background

Schumpeter (1934), also referred to as the Godfather of Innovation studies, was one of the first scholars to make impact in the field of innovation, with the focus on the individual entrepreneur, which strives to grasp a broad picture and pushes innovation towards the market. This understanding of innovation as an individual process continued for decades, before researchers began to conduct innovation studies in organizations (Van de Ven & Rogers 1988). Extending the field of innovation, researchers began to explore how one could structure the process of the product development. Researchers, such as Cooper (1990), examined the product development in depth and introduced linear and more rigid approaches that many companies deployed internally. However, some researchers started rejecting this stage-by-stage conception and called for deeper understanding of the dynamic nature of innovation processes (Van de Ven & Rogers 1988), thus still looking at the process as a closed entity. Researchers as Chesbrough et al. (2006) have later been opening up to the paradigm of open innovation enrolling several perspectives in the process by viewing innovation as a network model.

According to Baregheh, Rowley & Sambrook (2009), the essence of innovation can be described through the six components entitled; *Stages, Social, Means, Aim, Type* and *Nature (here called level)*, regardless of the organizational or disciplinary context. These six attributes were identified from a synthesis of 60 definitions of innovation represented over time and across various disciplines (Baregheh et al. 2009). To be comprehensive in outlaying innovation, these six components are described in the categorise for comparison in this chapter.

3.4.2 Clarification of innovation

The general definition of innovation has similarities with the sociocultural definition of creativity. However, the aspect of implementation is added: *Innovation is the multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their*

marketplace (Baregheh et al. 2009). Although, this definition encompasses means, aim, type, nature and the social aspect of innovation, I focus on the process of transforming the ideas into new/improved products, services or processes. As the empirical case is characterized by having an open-ended outcome I can and will not look at the implementation part of the definition when recognizing innovation, but rather encompass the multi-stage process of which generates the innovative outcome. Carlson et al. 2006 explains that innovation is a process from A to B where creating and delivering new customer value to the marketplace, and I consider this definition valid as innovation is the result of an actual innovation process.

3.4.3 Levels of innovation

Many scholars distinguish between incremental and radical innovations, when they speak of the nature of innovations and the level of novelty involved (Brady & Hobday 2011). From the perspective of the firm, an innovation can be radical or incremental depending on the perceived level of novelty (Sahay & Riley 2003). Radical innovations are referred to as leading to radical breakthroughs to potentially transform an industry and in contrast, incremental innovations are leading to minor changes (Tidd et al. 2005). The question is here, how much novelty is enough to make this distinction? A product can be new or improved to either the firm, the local market or the global market. In my point of view being new or improved to the firm is insufficient as one may be adopting an idea from a competitor. Whereas new or improved to the local and global market establish that there is a good that potentially can be traded and create value.

3.4.4 Type of innovation

The type of innovation refers to the kind of innovation, as in the type of output or the result of the innovation, e.g. product, service, process or technical (Baregheh et al. 2009). According to Tidd, Bessant & Pavitt (2005), The '4Ps' of innovation broadly covers the forms of innovation as: *Product innovation*, which is changes in the things (products/services) that organizations offer (ibid.). *Process innovation,* refers to changes in the way in which companies create and deliver their products or services (ibid.). *Position innovation* is changes

in the context of where an organization's product or services are being introduced (ibid.). Lastly, *Paradigm innovation* refers to changes in the underlying mental models that frame what the organization does. Each of the 4Ps of innovation can happen from incremental to radical change (Tidd et al. 2005).

Aim of innovation

The aim of innovation refers to the overall result that the organization wants to achieve through innovation (Bareghen et al. 2009), and is therefore related for the type of innovation that is pursued. As Plessis (in Bareghen et al. 2009) describes it as the creation of new knowledge and ideas to facilitate new business outcomes, aimed at improving internal business process and structures and to create market driven product and services. This aim varies depending on whether one wishes to successfully advance a product, process or service. Or whether the goal is to compete or differentiate the product, process or service at the market. Essentially, an innovation has a strategic aim to create some form of value that is reflected in the process of creating an innovation, Schumpeter (1934, in Darsø 2011): Innovation is novelty that provides economic value, and here explained by (Tidd et al. 2005): Innovation is recognised to play a central role in creating value and sustaining competitive advantage. Many researchers view innovation as the soul to the business that creates valuable unique products and services, in a rapid and competitive era that constitutes the current environment (Akram et al. 2011). Innovation is a 'weapon', which creates value to compete in the market by keeping in the loop with the environment that they are a part of (ibid.).

Social context

Innovation is situated in a context containing a social entity, system or group of people involved in the innovation process (Bareghen et al. 2009). The context relates to the specific industry or disciplinary context that the innovation is situated in. With this understanding, innovation can happen anywhere and is not only obliged to take place in organizational settings. The contextual factors of innovation are moderating the individual and organizational intelligences that are shaping the innovation (Glynn 1996). Innovation works are usually organized in teams with joint decisions making (Freeman & Engel 2007). These teams are often different from the rest of organization and in many cases working with separate spaces, budgets goals etc. (ibid.). Earlier, innovation was perceived to be hap-

pening from the doings of en entrepreneur, but I modern society researchers mostly speak of a collective social group when describing innovation.

3.4.5 Means of innovation

The means of innovation refers to the necessary resources (e.g. technical, creative, financial) that need to be in place for innovation to occur (Baregheh et al. 2009). Some researchers consider individual creativity as a crucial element of organizational innovation, a necessary but not sufficient condition for innovation (Amabile et a. 1996). Amabile argues that there will be no innovation in an organization without creative ideas from individuals; you need the ideas before you develop and implement them (Amabile 1989). Researcher Darsøe supports this understanding that innovation can be enriched through creative processes and creative tools, but innovation can be executed without creativity (Darsø 2011).

Plessis (2007) states that innovation depends upon knowledge, and describes innovation as a formation of new knowledge that helps the new business returns, which has the purpose to make acceptable products and services. In this view knowledge is the most essential part for creating innovation. In addition, internal and external knowledge collaboration is important for creating innovation (Akram et al. 2011). Internal collaboration utilizes diverse knowledge, which exists in the organization in form of tacit and explicit knowledge, where a pool of expertise can bring forth the innovation (ibid.). With external collaboration other partners or organizations are integrated to the core, which allows the pool of expertise to grow broader than the organizations boarders (Chesbrough 2003).

It is almost taken for granted, that technological and financial resource also serves importance to realize and create an innovation. However, I will argue that one needs the appropriate knowledge and expertise to apply these resources in order to make valuable growth.

3.5 The innovation process

Innovation is unfolding in a process with stages or steps taken during the evolvement of an innovation. The innovation process is usually defined by starting with an idea generation and ending with a commercialization. Through the history of innovation, the understanding of such a process has been progressing as researchers have advanced their understanding of the innovation process. According to Van de Ven & Rogers (1988), we can broadly approach two kinds of developmental processes; *Macro theory* and *Micro theory*. The macro approach describes and explains overall developmental process (Van de Ven & Rogers 1988). It prescribes general trends of development and explains how the long-term path evolves (ibid.). The Micro approach contradictory explains immediate action and describes the operative processes, which create developmental patters over the short term (ibid.). In addition, micro theory details interactions amongst persons, ideas and context that give rise to innovation.

When studying innovation both approaches are important as innovation is driven over longer periods, yet pushed through time by immediate action systems (Van de Ven & Rogers 1988), and for the sake of this thesis I will take this into account when selecting innovation process theories.

When selecting innovation process models the choice was set on Cooper's Stage Gate Model to encompass a micro-theory and Tidd et al.'s Innovation Process model to encompass a macro-theory. Moreover, The Stage Gate Model is one of the most prominent and utilized frameworks in literature and practice, even though it was one of the first suggested models in the field. To incorporate a more update view on the innovation process Tidd et al. process model was chosen with its more flexible and fuzzy perception on the process. Tidd et al.'s model is also rather recognized, but not as prominent as the Stage Gate Model.

3.5.1 The stage gate model

The Stage Gate Model was introduced by Cooper in the 1980's and been broadly adopted as a guide on how to drive new products to market (Cooper 2009). The process breaks down the innovation process into distinct and identifiable stages separated by manage-

ment decision gates (Cooper 2001). Each of the stages is formed to gather information needed to advance the project before it moves on to the next gate and decision point (ibid.). The stages serve as quality control checkpoints where go or no go decisions are made (ibid.). Cooper's theory can be defined as a micro theory with its detailed description of action, specific decision-making processes and interaction amongst managers and employees.
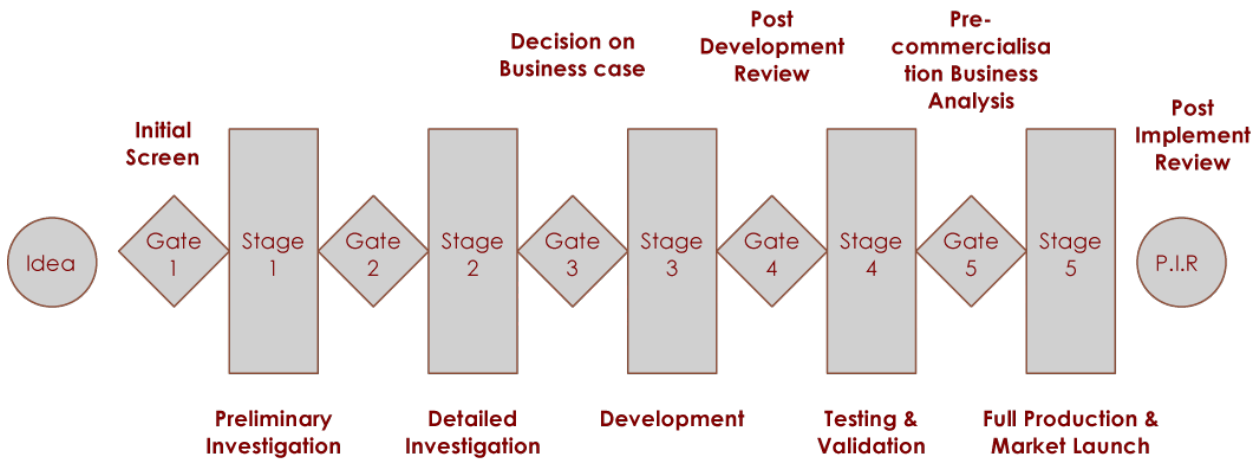

Figure 6 *The stage gate model (Cooper 2009)*

To stimulate idea creation Cooper (2009) suggests a front-end idea or discovery phase, where technical research, scenario building, customer research etc. are performed. This is followed by the idea screening, to check the idea's feasibility, attractiveness etc. (ibid.). Before it can go to the scoping stage (stage 1) (ibid.). At the scoping stage more information is gathered for a re-evaluation at gate two (ibid.). At this gate the financial return is assessed. For projects passing gate two an initial business case is made with specific product definitions and value propositions (ibid.). Gate 3 is the final screening point before the development stage and here a review of financial activities are undertaken to secure at solid case before committing to further development at stage 3 (ibid.). At the development stage prototypes are created to test the quality of the idea to be tested at gate 4, where the project as a whole is tested (ibid.). At stage 4 and here the product itself, production process, customer acceptance and economics will be tested before it can move further to the final gate leading the way to full commercialization (ibid.). A product can pass this final gate depending on expected financial return viability of start-up plans (ibid.).

The stage Gate Model is a rather controlled process and is not appropriate for more loose dynamics. The rigid structure suits companies that are operating in a high-risk environment as the model reduces the chance of failing, however such a ridged structure cannot encompass the dynamics uncontrollable features of reality.

3.5.2 The innovation process model

In contrast to Cooper (2009), Tidd, Bessant & Pavitt (2005) suggest an innovation process at a more abstract level and outlines a more generic process with broader characteristics, leaving it up to companies to shape the model in a suitable manner. In the process innovation is continuously adapted in the light of new information and learning. This process model can be defined as a macro theory for the innovation process, with its general and overall developmental process.
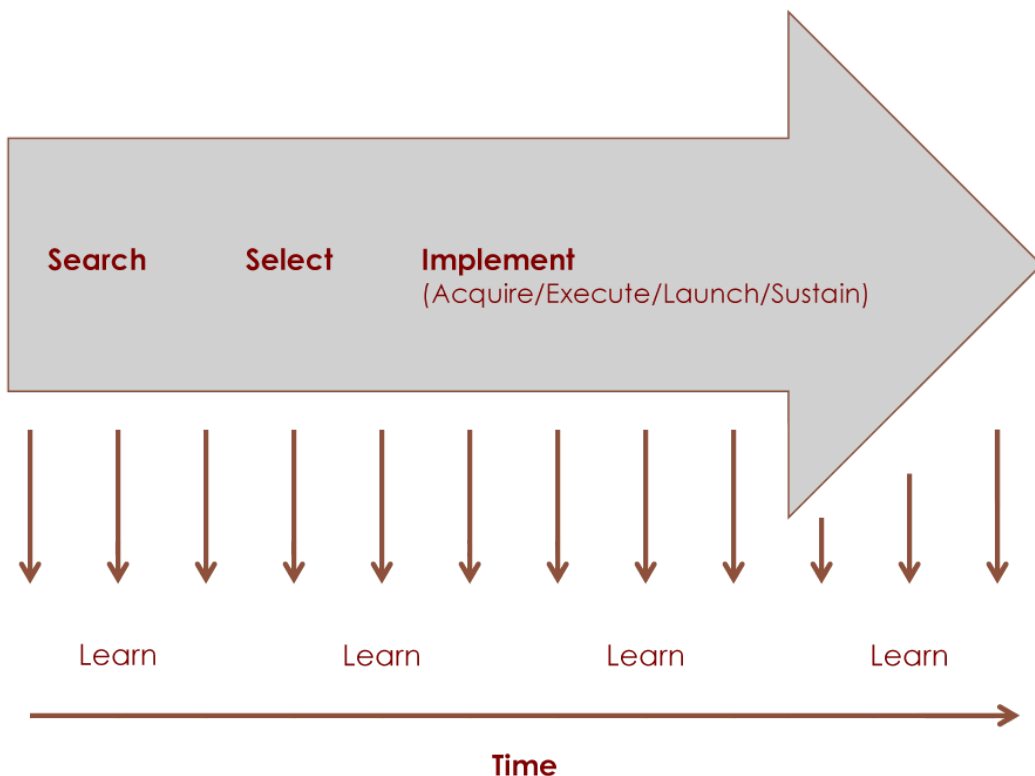
Figure 7 *The innovation process model (Tidd et al. 2005)*

The first phase in the innovation process is termed as **Searching**, which involves scanning the environment, internally and externally, detecting and processing relevant/potential signals about threats and opportunity for change (Tidd et al. 2005). In order to identify, process and select the signals Tidd et al. (2005) suggest that the company develops appropriate search patterns.

The searching phase is followed by **Selecting**, where it is decided on which signal to response to (Tidd et al. 2005). To minimize risk the choice has to be made on the basis of the overall business strategy of the firm and build upon the established competencies in the company (ibid.). If knowledge is required externally companies needs to develop relationships where necessary resources, equipment and knowledge can be obtained (ibid.).

Once having detected signals and decided upon on which to pursue, potential ideas needs to be turned into some kind of form, whether it is a new product, process, change in process, shift in business model etc. This stage is identified as **Implementing,** and consists of the elements; **Acquiring, Execution, Launching and Sustaining** (Tidd et al. 2005).

In the beginning of the implementation process there is high uncertainty and the corporation will need to **acquire** the knowledge resources to enable the innovation from market research, generation of technical knowledge, etc. from internal and external sources (Tidd et al. 2005). This process both leads back to the initial concept stage and forward to further development (ibid.). The process will lead to an **execution** of the project under uncertain conditions, where extensive problem solving is needed to narrow the project and develop an innovation ready to launch (ibid.). In parallel with the technical problem-solving one needs to prepare the market in which the innovation will be **launched** (ibid.). Once the final project is launched one needs **sustain** the project by adopting, or even revisiting and modifying the original idea (re-innovate) (ibid.). In this way corporations shall utilize their learning from progression through the cycle to build knowledge base and improve the way their process progresses (ibid.).
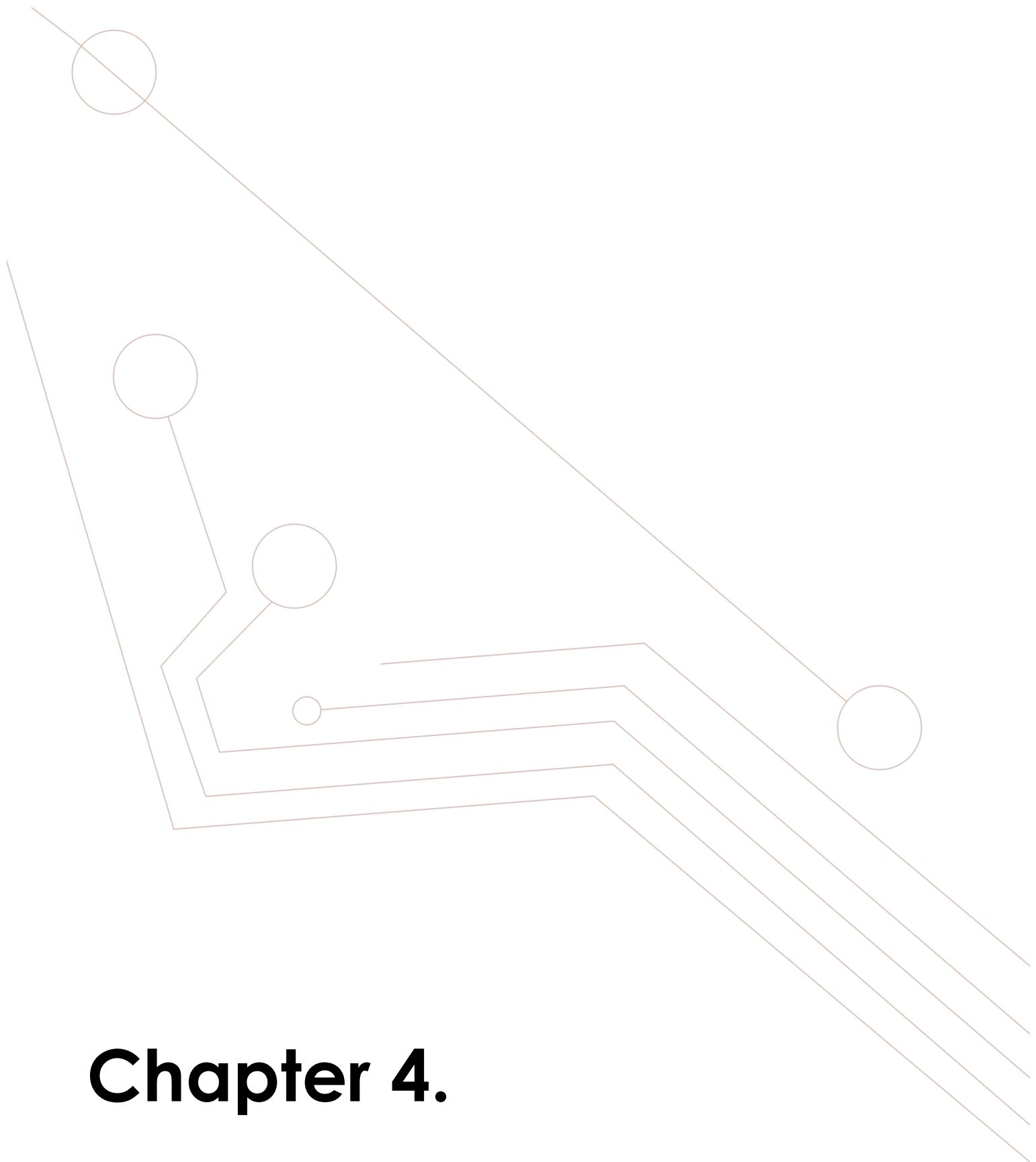
Chapter 4.

Analysis Vol. I

This chapter serves to answer sub-question Q1: *how can the creative process and the innovation process be combined theoretically in an integrated explorative framework?* Before the innovation and creativity process models can be integrated, the differences and similarities within the respective creative process models and within the innovation process models will be synthesised and clarified. Next, this analysis will go through differences and similarities across the two fields' representation of process models. Lastly, the analysis will develop into a theoretical exploratory framework.

Figure 8 illustrates how the theoretical analysis will be conducted in three steps. In the first step the level of information is rather broad when finding similarities and differences in the separate fields. In order to progress to the next step where creative and innovation models will be compared, the level of information and details will be reduced. When entering the last step of the analysis, with the creation of the explorative framework additional details and elements from the respective fields, will be undermined in order to make room for a framework that has a decent flow and which is consistent. With this

STEP 1

Differences / Similarities   Differences / Similarities
Creative Process Models   Innovation Process Models

STEP 2

Creative Process Models
vs.
Innovation Process Models

STEP 3

Theoretical Explorative
Framework

Figure 8 *Explanation of analysis Vol. I*

type of analysis elements and aspects will be lost, when synthesising four different kinds of process models into one framework.

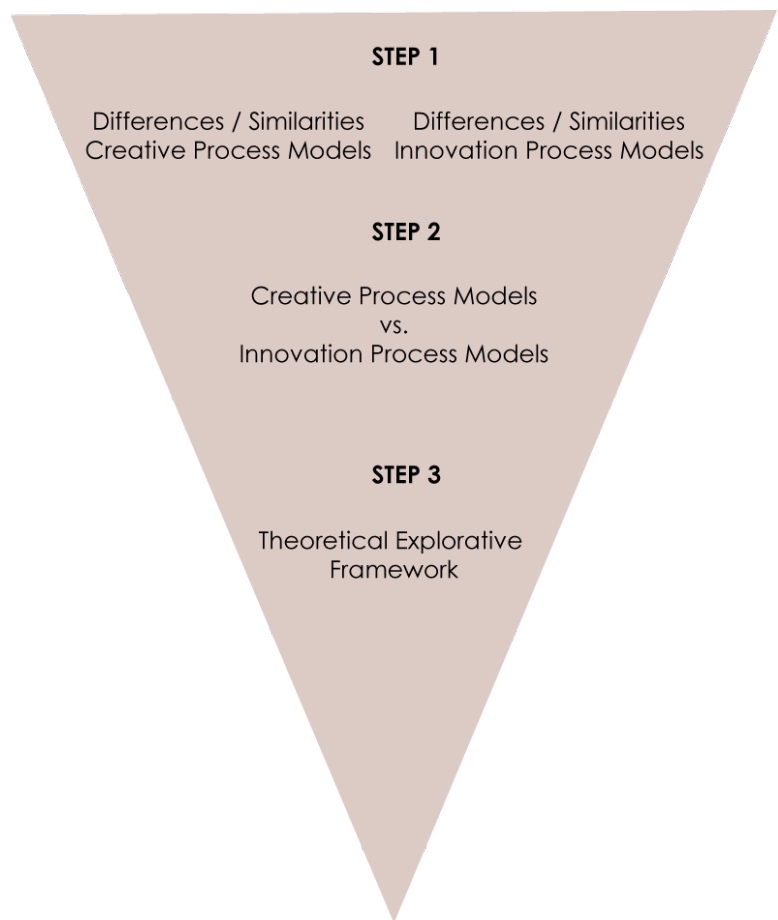# 4.1 Step 1a: Differences and similarities in the creative process models

To get a visual overview of the differences and similarities between the process models of creativity figure 9 has been created. The model is a simplistic view to compare the two process models and how they constitute the development of the phases.
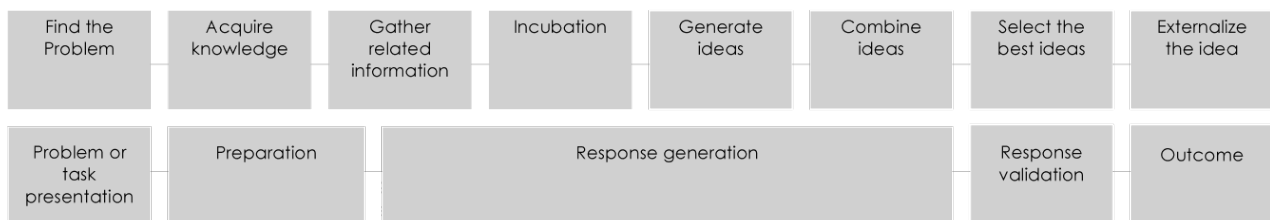
Find the Problem	Acquire knowledge	Gather related information	Incubation	Generate ideas	Combine ideas	Select the best ideas	Externalize the idea

Problem or task presentation	Preparation	Response generation				Response validation	Outcome

Figure 9 *Simplification of the different phases in the creative process models. From the top: The eights stages of creativity (Sawyer 2012) and The Creative Process (Amabile 1996).*

Although, both process models can be labelled in regards to Sawyer (2012)'s term *action theories,* it has to be mentioned that Sawyer (2012)'s model is constituted of both process understandings from practical execution of the creative process and purely mental understandings of creative execution. Sawyer (2012) draws on e.g. Wallas (1926)' framework, which focus on the *person* understanding of creativity. This has a consequence of some of the stages being dominated by mental processes and concepts such as divergent thinking, convergent thinking, incubation and fixation etc. These elements cannot directly be observed, but concepts such as divergence and convergence can instead be pinpointed through observable creative production in form of number of expressed ideas. Amabile (1996)'s framework serves to explain the planned or practical process of creativity, but has additionally integrated concepts deriving from the *person* approach with the concept of motivation, creativity-relevant skills and domain-relevant skills. Amabile (1996)'s concept of creativity-relevant skills encompasses cognitive ways of thinking and the framework also draws on mental process elements. It is arguable to work with the two theories in an integrated manner as they have the underlying understanding of the creative process as something that happens over time.

Both process models presented by Amabile (1996) and Sawyer (2012) starts with a problem finding phase and emphasise the importance of the problem being either *ill-defined*

or *motivating* to propel the creative process. Moreover both processes end with an outcome, which can be judged. Conceptually, they both draw on the concepts of *divergent thinking*, *convergent thinking*, *problem finding* and *domain-specificity*. However, Amabile (1996) stresses the importance of task-motivation as the vital element for accelerating the creative performance as it will determinate how "far" the individual is willing to go.

Both processes guide the problem-finding stage into a preparation stage where knowledge needs to be acquired in order to get a holistic scope of the field engaged in. Entering the third stage in the respective process models, there is a difference as Sawyer (2012) divides, what Amabile (1996) labels as *Response generation*, into *gather related information, generating ideas and combining ideas*. Thus, they both agree on the fact that creative abilities are to be utilized in this phase. Amabile (1996) emphasis the use of creativity-relevant skills and Sawyer (2012) explains it with terms as analogical thinking, divergent thinking and by exploring new path for inspiration. It can be discussed weather or not a more or less detailed view on this phase is appropriate in practice. Sawyer (2012)'s detailed view is appropriate as a thorough guide, whereas Amabile (1996)'s broader category can be appropriate as an overview of what is happening.

In addition, Sawyer (2012) explicates a phase of incubation in this culmination of response generation. Incubation is not a phase as such in Amabile (1996)'s theory. She explains it as something that happens when individuals selectively make the problem salient and then taking it up for consideration at a later stage.

In both cases, what one can label as the idea generation phase is followed by a selection or validation of ideas to get the aspect of appropriateness and usefulness to the domain. Moreover, both processes emphasis the importance of knowledge related to the domain in order to generate appropriate and original outcomes.

To sum up, the processes share many of the same features and phases of a creative process. The major difference is found in the level of detail and the usage of language and concepts when explaining the creative process. Amabile (1996) draws on some of the same cognitive concepts as Sawyer (2012), but adds her own componential framework in the discussion.

4.2 Step 1b: Differences and similarities in the innovation process models

As in the former part of the analysis, a figure for getting a visual overview of the differences and similarities of the process models of innovation has been created (see figure 10). The model serves as a simplistic view to compare the two process models and how they constitute the development of the phases.
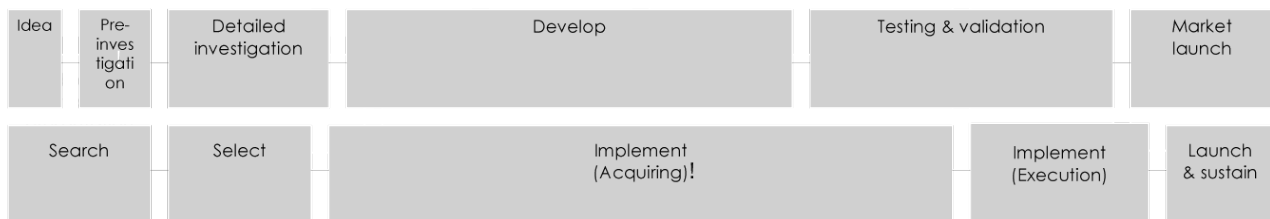

Figure 10 *Simplification of the different phases in the innovation process models. From the top: The Stage Gate Model (Cooper 2009) and Innovation Process Model (Tidd et al. 2005).*

To begin with, the processes proposed by Cooper (2009) and Tidd et al. (2005) are very distinct in how an innovation process is perceived. The only direct resemblance occurs to be the fact that both processes is guided by an aim of launching products, resulting in an outcome to be presented to the market.

Cooper (2009)'s model builds on the assumption that the idea is present from the beginning. Tidd et al. (2005) starts off their process model with a search phase where the environment is scanned for possible stimulus to act on.

Where Cooper (2009)'s process model is controlled and ridged, Tidd et al. (2005) propose a more flexible structure guiding an idea to realization. The Stage Gate model has a strong focus to minimize risk, where Tidd et al. (2005) suggest continuing under uncertainties. Cooper (2009)'s model eliminates risk and failure with a detailed action pan, eliminating "weak" projects early in the process, where Tidd et al. (2005) suggest more general criteria, in form of business strategy alignment, for minimizing risky outputs.

In addition, Tidd et al. (2005) opens up for the possibility to alter the idea after it has been launched, by utilizing learning of feedback from the market. This is explicitly not the case

at Cooper (2009)'s model where the idea has been evaluated, tested and validated several times to fit the market perfectly before launching. The Stage Gate Model does not utilize learning once the project is done. The learning only happens through the process with the focus of streamlining and improving this specific project. This makes the Stage Gate Model discontinuous following a path from A to B. Opposite Tidd et al. (2005) propose iterations. In addition, Cooper (2009) emphasis this with his focus on *doing it right the first time*. Speed is everything in the Stage Gate Model where time is considered profit and the goal to reduce the development cycle. Therefore, Copper (2009) suggests that corporations need to concentrate their resource and have people working on few or one project at the time.

The level of detail is also rather distinct in the two process models. Cooper (2009) has explicated the roles and tasks for managers as gatekeepers or decision makers and participant as the force being involved in development, testing, research etc. This level of detail is not present in Tidd et al. (2005)'s process.

The concept of knowledge is also used in different ways in both models. In the Stage Gate Model, knowledge is used continually to test and validate the idea, where the process model suggested by Tidd et al. (2005) utilizes knowledge by acquiring external and internal to form and shape the ide.

In general the Stage Gate Model and the Innovation Process Model are rather distinct with more differences than similarities. Yet both models have the idea generation as a front-end element and lead this phase with testing and validation until launching.

4.3 Step 2: Innovation process vs. creative process

To get a collective overview of the differences and similarities of the process models of innovation and creativity figure 11 has been created. The model is sorly an exploraty framework to illustarte how the different theoretical process is understood. Furthermore, the model is only an exploratory comparison developed on the basis on the theoretical understandings and not a final framework of how the creative process and innovation process functions jointly in reality.
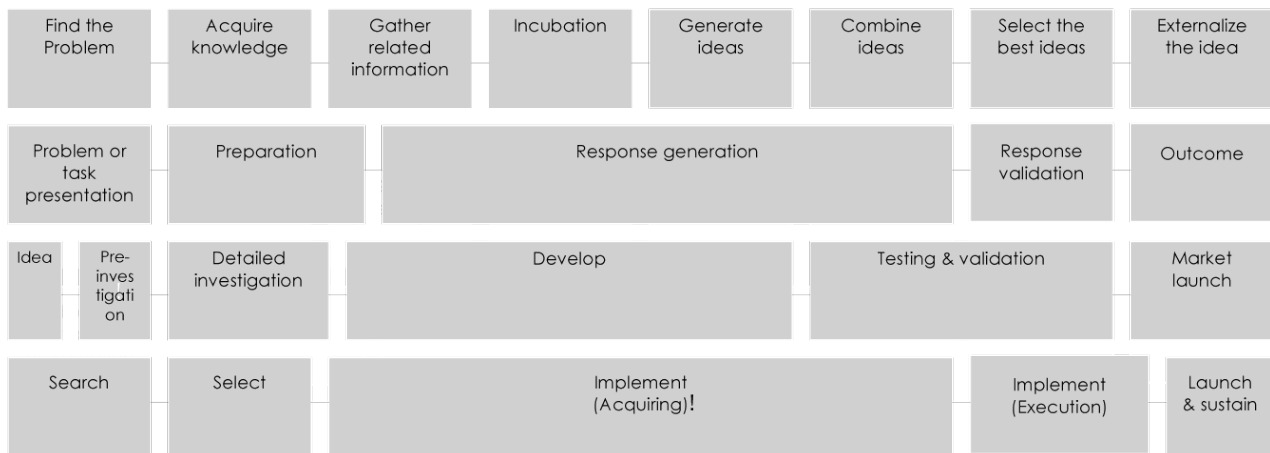
Find the Problem	Acquire knowledge	Gather related information	Incubation	Generate ideas	Combine ideas	Select the best ideas	Externalize the idea

Problem or task presentation	Preparation	Response generation			Response validation	Outcome

Idea	Pre-investigation	Detailed investigation	Develop	Testing & validation	Market launch

Search	Select	Implement (Acquiring)!	Implement (Execution)	Launch & sustain

Figure 11 *Simplification of the different phases in the creative and innovation process models. From the top: The eights Stages of creativity (Sawyer 2012), The Creative Process (Amabile 1996), The Stage Gate Model (Cooper 2009), and Innovation Process Model (Tidd et al. 2005).*

When comparing creative process models and innovation process model it is important to mention that innovation process models are reflected on a purely practical level and the creative models constitute both mental and practical levels, by having mental stages incorporated in the planned process of creativity. This difference provides deeper level of details in the creativity view of process when having explanations of where and how ideas emerge. The creativity process models are explaining the process through the cognitive pathways that individuals undergo and are more detailed when taking mental process understandings into account. They explain how and why the process develops through either motivation or cognition. Cooper (2009) explains how the process evolves at an action approach by driving the process forward with continues validation, testing and management decisions. Although, the models can still be combined in the practical sense together with an explanation of how the creative production occurs. Thus, concepts from creativity literature will dominate the final framework in the form of creative tools in the integrated framework, as innovation process models does not provide an alternative.

Tidd et al. (2005)'s innovation process models has some resembles with the creative process models by starting off with a *problem finding* like phase, where one search the environment for possibilities. As mentioned, Cooper (2009) assumes that an idea is present from the beginning. You do not go and look for a problem that eventually can lead you to an idea.

The Stage-Gate model also conflicts with some of the basic understandings from the creative process, by dividing managers and participants up in to distinct groups. According to the creative process theorists, one needs to acquire knowledge, *domain-relevant skills*, and get familiar with the domain. If managers not undergo the same research process as the participants, they will not have the abilities to judge weather or not an idea is *useful, novel* and *appropriate*. Unless, they are already experts in the fields and have been updating their knowledge in parallel with the process. However, all of the process models utilize knowledge in some form of the other. Where knowledge is mostly used for testing and validating in the innovation process view, knowledge is used for both inspiration and validation in the creative process view.

In a very simplistic view both the creative process and the innovation process is a path from A to B, the difference lies in the fact that this journey has several detours in the creative process as iterations and divergent thinking happens throughout the process. The innovation process view is build to avoid that specific element by testing, validating and streamlining the focus through the entire process. In the creative process validating and testing is present, but it has the purpose of making an idea useful and original, not perfectly fitted and streamlined.

The challenge of combining the two perspectives lies in the fact that creativity is perceived as a front-end element in the innovation process, which is followed by convergent stages. It will be challenging to combine the two perspectives in a way that does not undermine or kill creativity and/or does not lead to an outcome that the innovation process aim for. An additional challenge occurs in regards to weighting the different stages. Neither, Sawyer (2012), Amabile (1996) or Tidd et al. (2005) describes the concept of time when explaining their process models. Although, Cooper (2009) is rather specific when explicating the amount of time spent in some of the stages. In the Stage Gate Model the scoping stage is set to be a little less than 30 days, the step from stage 4 to 5 is to be 3-5 months and the post-launch is to be everything from 6-19 months. There is not set a specific timeframe for the entire process but indicators that shows that we are dealing with approximately two years. The concept of time provides some challenges when integrating the models in one framework.

4.4 Step 3: The phases in the integrated framework

As mentioned creativity and Innovation has emerged from separate domains and they have different languages, symbols, modes of reasoning, terminologies etc. In the framework I will strive to combine both by using concepts and explanations from both fields.
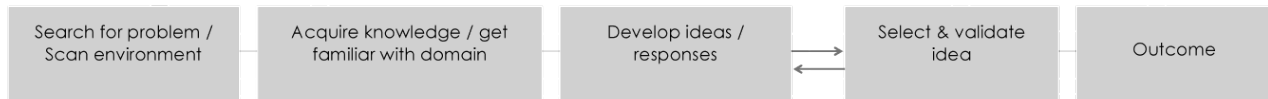

Figure 12 *Framework for creativity and innovation*

Step 1: Search for problem / scan environment
The first step is characterized with a problem-finding phase were the environment is scanned in order to pick up potential problems or possibilities to act on. The phase is therefore a divergent phase where one has to get a holistic scope of stimuli to act on. Finding a problem is essential, as it will lead to task motivation, which will determine how 'far' the individual will go and how involved the individual will be to solve the problem.

Step 2: Acquire knowledge / get familiar with domain
Step two is to acquire knowledge in order to get familiar with the domain if the domain-relevant skills are not in place. In addition, knowledge that is not from the domain but related is to be acquired in order to inspire and provide novelty.

Step 3: Develop ideas / responses
The third is also a divergent phase where ideas or responses are made on the basis of the knowledge that has been acquired. In order to generate better ideas, different individuals from various domains are important to get novel outcomes.

Both the innovation process model and the creative process models suggest iterations in one way or the other, and I suggest iteration between this stage and the following, in order to develop and test until the idea has meet whatever specific criteria set.

Step 4: Select & validate idea
The fourth step is characterized as a convergent phase ideas or responses are evaluated, selected and validated on the basis of criteria. These criteria are made from a knowledgeable foundation from the domain. When selecting established competencies also

have to taken into account, hence the need to be collected externally if not established internally.

Step 5: Outcome

The last step is to externalize the ide or response with materials in order to make it shared and understood. The externalization can also help shape the idea when working with it physically. In innovation terms the idea is put to market and hereafter re-invented if necessary. Learning is in this way utilized continuously.

4.5 Sub-conclusion

To sum up, the integrated framework with the five stages is an exploratory theoretical proposal on how the creative process and the innovation process could be integrated based on theoretical considerations from a selection of the most prominent theorists within both fields. There are some challenges when combining the process models as they have different perspective on utilization of knowledge. They have rather different understandings of where creativity occurs in the process, as the innovation models staring phases resembles divergent stage and then converges to pursue the aim of generating a feasible product. Opposite the creative process model has divergent stages throughout the process.

Decision of elements that needs to be undermined has to be made in order to have a united framework. The phase of incubation from the creative process models is one aspect that have been taken out completely, both to difficulties for integration in a creative innovation model and also due to its tacit form that makes it difficult to integrate in an action approach. The idea of having front-end creativity is additionally one element that has been undermined from the innovation process models, as it would destroy the fundamental understanding of the creative process models.

The model brings some challenges for practical application, as the theorists not consider the aspect of time in detail. Thus, the empirical case becomes even more essential when striving to get a closer look on how the creative process and the innovation process functions together. Reflecting on my result, I expect the different phase being weighting differ-

ently across time and not equally as it looks like in the generated process. In terms of time there is also the practical challenge of the understanding of when a process is done from an innovation and creative perspective. According the creativity the process is complete upon even simple externalization, such as sketching etc. Where the innovation theory is somewhat complete when the product has entered the market. Both understandings have to be undermined to create one understanding of a process and this constructed process ends with an outcome in the process at large, and not when a sketch is made or when/if the outcome goes to the market.
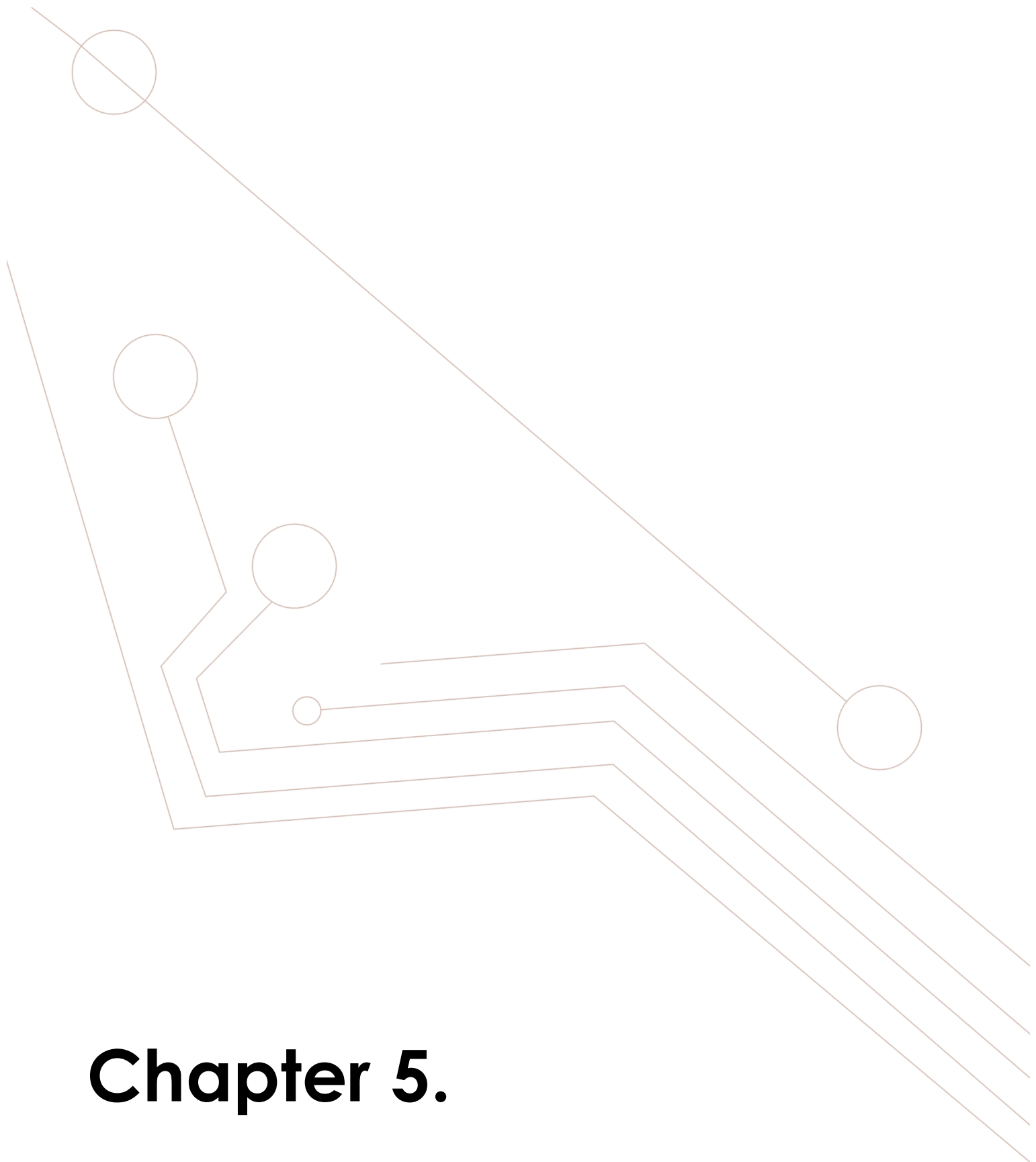
Chapter 5.

Analysis Vol. II

This section serves to analyse my empirical data in order to answer sub-question Q2: *how does the creative exercises occur in relation to the innovation process at 'The Innovation Inspired by Nature Summer School 2013'?* Firstly, I will identify and analyse key trends within the development of my creative process concepts. Secondly, I will identify and analyse how the innovation tracks progressed based on my observation of the innovation process concepts.

5.1 Creativity – Trends

From my empirical data I have developed an analytical tool to visualize and communicate my findings. Please see enclosed appendix 12 for a larger version of the creative activities and exercises.
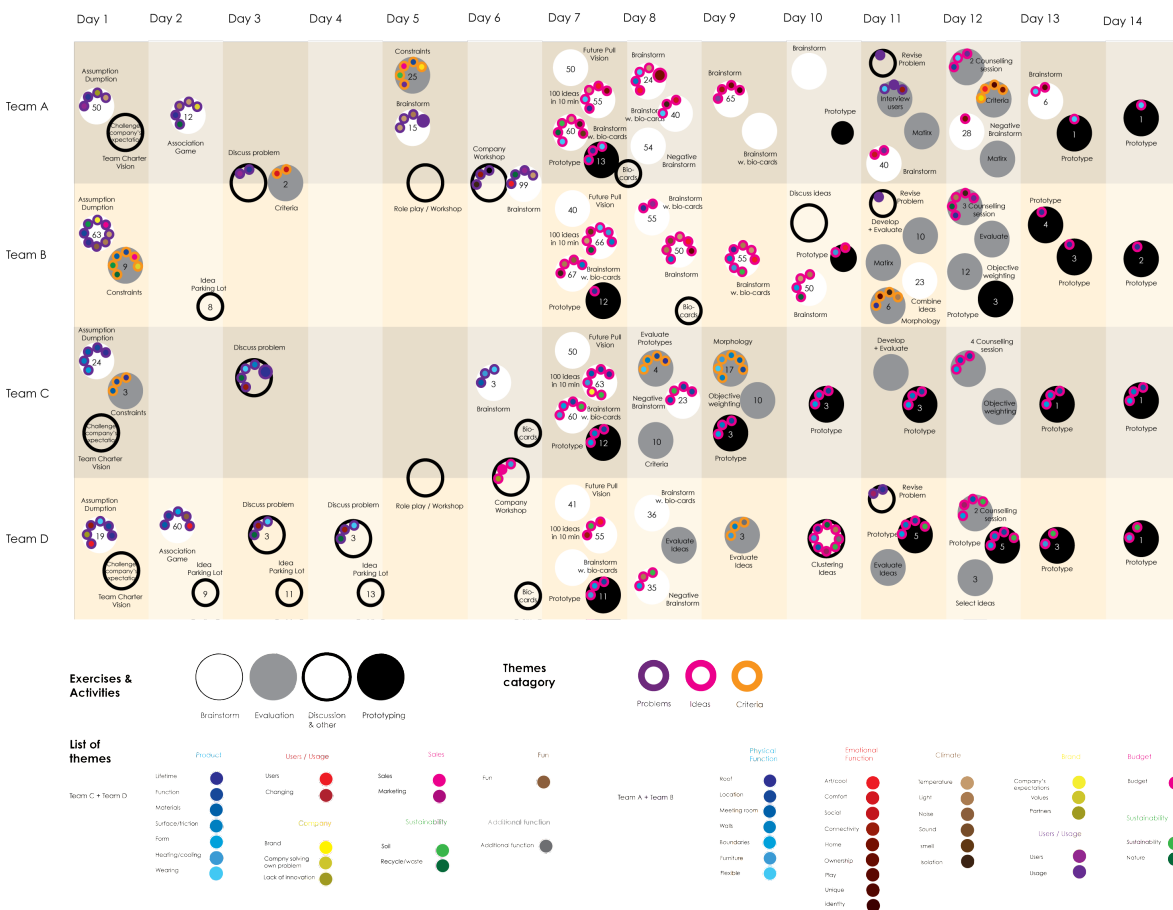

Figure 13 *Creative activities & exercises*

5.1.1 Trend 1: Exploring problem

When the groups started the work in week one they had already been introduced to their respective problems. Team C and team D were to solve an innovation challenge for company X and team A and team B were to solve an innovation challenge for company Y. It is important to mention that the innovation challenge and problem from company X was rather closed and much different that the challenge proposed by company Y, which had a more open problem. The difference showed to translate into different
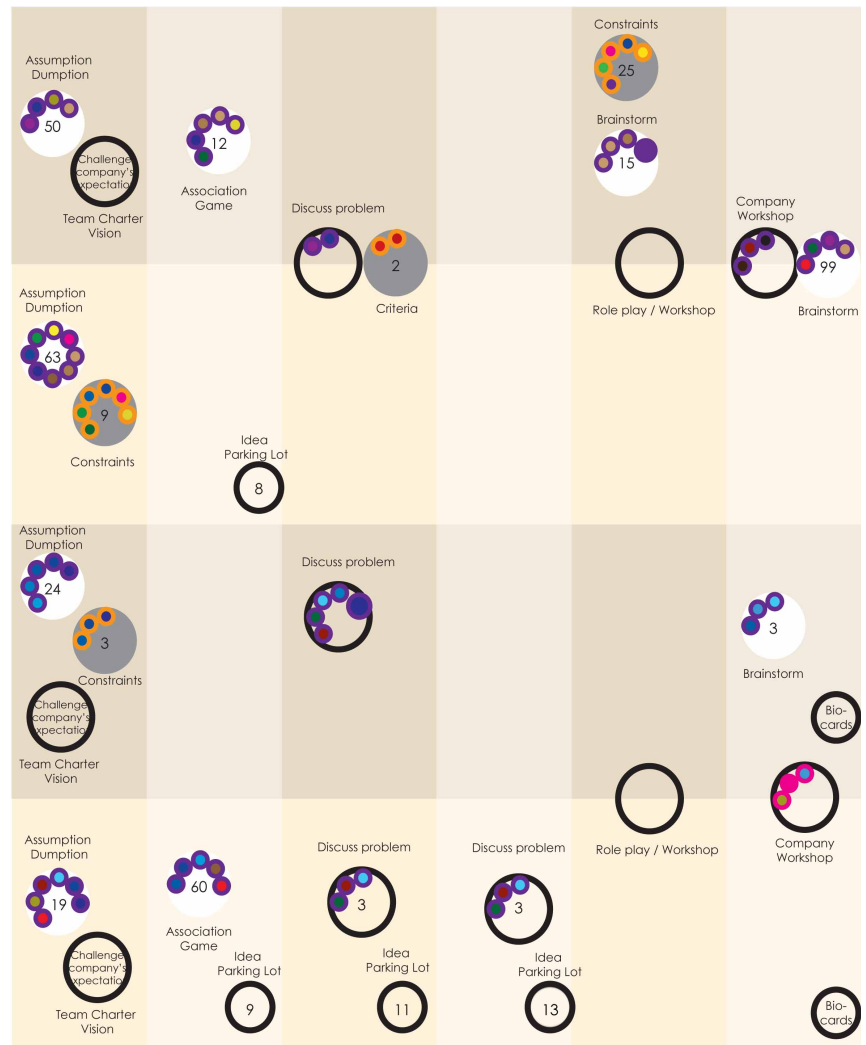

Figure 14 *Day 1-6 - Team A, Team B, Team C and Team D.*

process patterns for the groups. Figure 14 demonstrates how team A and team B were much more divergent than team C and team D in the beginning, when they started to work on the problem in day 1. Team A and team B had a much more abstract and non-technical problem than team C and team D, which had been introduced to a very technical problem that required domain specific knowledge. The great difference in divergence within the two groups relates to the difference in the problem space and structure, which allowed team A and team B to be much more explorative and divergent.

Figure 14 illustrates that team C, in the problem discovery phase, quickly started to focus on three themes that were present at day 1, 3 and 6. Team D also had recurring themes

during the same period, but they were slightly more divergent than their sister group, as they covered a greater variety of themes when exploring the problem. In the same period where team C and team D were focusing their problem, team A and team B progressed in patterns much differently. At day 3, team A and team B worked together on scoping the problem, but it seemed challenging: *They start to work on a brainstorm on the problem, but it is very difficult for them to dive into the problem. They are struggling with solution vs. problem and it is difficult for them to get started (…) The facilitator pushes them and asks if there are other problems (...) One of the students does not think it is possible to answer what they have come up with. They end the day and it seems like they did not go that far with the problem* (Appx. 9: 456-471). They could not find the scope of the problem and the divergence showed to proceed as they had a new brainstorm on problems with great divergence at day 6. The brainstorm occurred right after the teams had the company workshop, where a new theme showed. Team A and team B discovered that the proposed problem by the company did not exist and that they were solving a made up problem. There was essentially no problem (Appx. 9: 765-782). The session for team A and team B opened their problem space further as they found out that there were no actual scope to their problem.

5.1.2 Trend 2: Generating problems and ideas

When it comes to the trend of generating problems and ideas different patterns within the groups seemed to evolve throughout the process. Team C and team D utilized the creative exercises brainstorms from day 1 to day 8 where they had their last brainstorming session (see figure 15). Team B utilized the creative exercise up until day 11 and team A were performing brainstorms until day 13, which is one day before their process ends (see figure 16). Where team C and team D had a more 'streamlined' process with a frontload of problem and idea generation, team A and team B were performing the same exercises throughout the process. The use of creative exercises at different stages in the process can be an expression by different utili-

Figure 15 *Day 7-8 - Team C & Team D.*

zation of the exercises. The last brainstorm that team B performed was *combining ideas*.
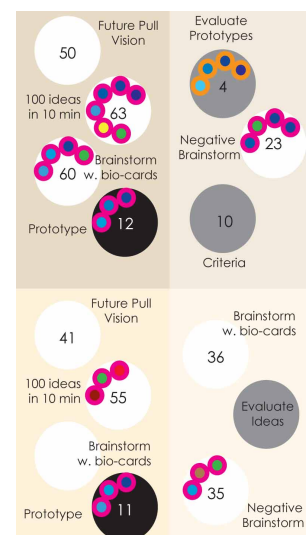
The exercise was done in correlation to the evaluation exercise *matrix* where they clustered their ideas (Appx. 9: 1417-1434). Once they had done the matrix I observed the following: *They go through their new ideas and combines them with the old ideas. They are more detailed and work with many functions. Brainstorm resulted in 1x4, 1x8, 1x3, and 1x8.*

They got fewer ideas but more detailed and they are also combined (Appx. 9: 1494-1499). The creative exercise was not only used as a tool for divergence, as it generated convergence by resulting in fewer, more detailed and combined ideas. The same use of brainstorms for convergence was observed in team A in their last brainstorming session at day 13: *They start a brainstorm based on work & play individually for 30 min. It gave 6 ideas that they have put on the wall (...) It is difficult to see where the ideas come from, but they say that the ideas are not new. They are from earlier where they created good ideas, but now they*

Figure 16 *Day 11-13 - Team A & Team B.*

are just more focused. So even though they are not using bio directly they still have the knowledge from before that they are using (Appx. 9: 1758-1766). Again the session is used to focus and a way to utilize the knowledge and ideas gained earlier. The same pattern is not found in either team C or team D that had *negative brainstorm* as their last idea generating exercise. One of the students from team C expressed that the exercise generated *"crazy ideas"* (Appx. 10: 4-10), so it was rather a tool to go far in the associations than a tool to combine ideas or create focus as scope.
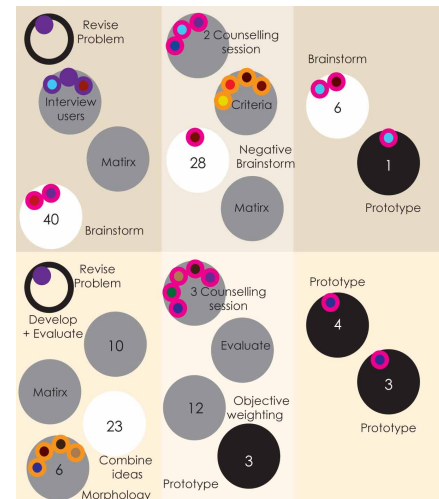
5.1.3 Trend 3: Exploring methods

In the activity map it shows how a radical shift in the activities are changing for all the groups at day 7. This is due to forced participation in scheduled brainstorming and prototyping sessions with structured facilitation (Appx. 9: 876-999). Regardless of where the groups were before that day they all showed divergence with great number of ideas from each exercise and great variety of explored themes. Team A explored 9 different themes and 3 new themes evolved. Team B explored 7 themes and had also 3 new themes evolving. Both team C and team D explored 6 different themes and had 2 new themes evolv-

ing, that they had not touched upon earlier in the process. Before this day team C and team D had already been circulating around 3 themes each, and the forced creative exercises pushed them back to a more divergent stage.

In figure 17 it shows that team C and team D created their own bio-cards[1] before day 7. This showed to have an effect when the groups started to work on the exercise *100 ideas in 10 min.* and *brain-walking with bio-cards.* When they had to do *100 ideas in 10 min.* I observed the following: *Team C have a really good tempo, after 3 min= 21 ideas, after 7 min=49 ideas. Both team C and team D are using nature in their idea generation (both bio-mimetic and bio-inspired[2]). Team A and team B have only bio-inspired solutions, but they didn't make the bio-cards. They get inspired as they start the exercise* (Appx. 9: 927-932). One of the students from team C said that: *"The fact that we made bio-cards made us more focused"* (Appx. 9: 935-936). It seems like they unconsciously were working with a constraint of the fact that it shall be useful and bio-mimetic. In addition, it showed an effect when they were to perform brain-walking with bio-cards: *team C has made bio-cards and starts right away. Team A and team B did not make bio-cards and uses some cards that one of the facilitator brought. It*

Figure 17 *Day 6-8 - Team A, Team B, Team C & Team D.*

seems like there is a big difference in the ideas from the ones who made bio-cards and the ones that did not (Appx. 9: 939-943). The groups that started with bio-cards were already focused on specific functions from nature and generated ideas, which resulted in
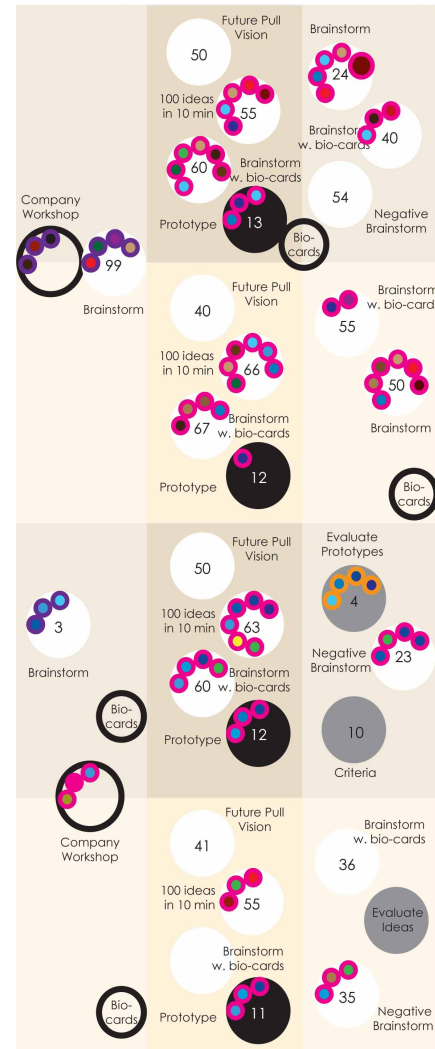
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[1] A Bio-card is a tool within biomimicry that explain a specific function from biology in engineering and biological terms. The tool is used for gaining deep understanding with a function, in order to translate it to other fields.

[2] Bio-mimetic and bio-inspired refers in this context to how well the source of inspiration (biology) is being translated in the analogies. In bio-mimetic translations the function is directly translated into the idea/concept. In bio-inspired the source of inspiration (biology) is merely used as actual inspiration and the function is not translated directly.

more direct translations from biology to ideas when making analogies. As some of the students express, having made and used bio-cards also worked as a constraint and they could make stronger analogies and use the inspiration source 'nature' in a profound way.

As mentioned the day was facilitated and the students were guided step by step. It was extremely structured and there were implemented 'competition' elements, as they had to present the result of each exercise to the other teams (Appx. 9: 885-958). The structure can be seen as a factor that allowed them to solely focusing on generating ideas and being divergent when letting go and following the instructions. Structures are not as such the focus of this study, but it has to be mentioned as it had an obvious effect.

5.1.4 Trend 4: Validation of ideas and problems

Figure 18 illustrates how different evaluation exercises started to occur and various indications towards convergence were present after day 10. There was an occurring trend within three of the groups that showed the activity *revision of problem* at day 11. I observed frustration and doubt from e.g. team D that started to discuss the problem based on the feedback session that they had at day 10. The students express: *"Are we just to give them inspiration?" "Shall we make them think out of the box?"* and *"We have these three ideas and it is random how we put them together"* (Appx. 9: 1371-1374). They felt useless and doubted the problem that they had been working on, and it was explicitly mentioned that it was a consequence of the feedback session from day 10, where all the groups had been externally challenged on their selected problems. In the session the challenge from facilitators, students and lecturers can be seen in the comments from the facilitator of team D: *"What is actually the problem? Will people use it? Isn't the*
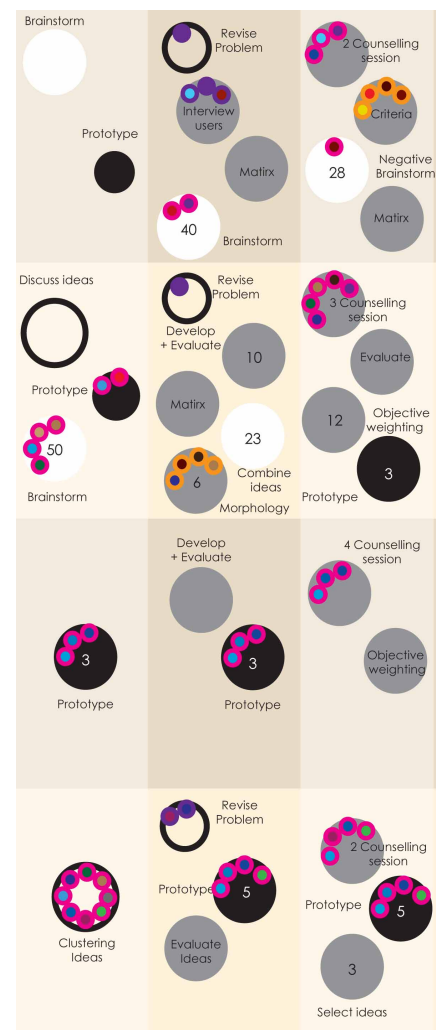

Figure 18 *Day 10-12 - Team A, Team B, Team C & Team D.*

problem butter on the bread vs. innovation? Isn't the problem that the company can't think out of the box?"(Appx. 9: 1324-1327). In addition Joakim Rex points out to team D that the company already did a product that can last for 8 years. The groups working with company Y was also challenged in regards to their problem with comments such as *"But is it a need or a problem you are solving? Can people actually use it?"* Joakim Rex (Appx. 9: 1363-1364) and *"What is the purpose and whom is it for?"* Marjanne Kurth (Appx. 10:89-90).

Besides the revision of problems all the groups also started to perform evaluation exercises. Team A and team B had not been performing this form of exercise previous in the process, and it is interesting that it happened in synch within the groups at day 11. The sudden change in activity can be a result of the fact that the groups were introduced to a lecture in *idea selection and concept development* at day 10. Here they were introduced to selection and evaluation tools as *matrix, morphology, objective weighting* and *ide checklist* (Appx. 9: 1221-1251). After this session one of the students from team A expressed *"We should have had that tool on Monday"*, and they seemed frustrated of not having learned it earlier in the process (Appx. 9: 1258-1261). The need for exercise to converge was present, but they were lacking skills to actually pursue it and start to converge earlier. It is seen that both team A and team B picked up on specific exercises that were introduced such as *matrix, morphology* and *objective weighting*. However after the introduction team C expressed *"We have already done morphology and weighting as we knew the tools from before hand"* and is continuing to develop their prototype and presentation (Appx. 9: 1261-1263). This shows that having the right tools to implement at the right time is important to start the convergence phase, as team A could have been starting this process earlier if they have had the skills and tools to do so.

5.1.5 Trend 5: External knowledge input

All the groups had the opportunity to engage in planned counselling sessions with four different experts within the field of biology and engineering at day 12. From the activity map it is found that the following days showed sign of convergence in all the groups, in form of fever and focused prototyping, which can be due to external knowledge input that they received at the sessions. Even though the groups in general converged as a result of the sessions, they used the sessions differently. Figure 19 illustrates how one of the themes, which team A discussed on one of the sessions proceeded in the rest of their process. According to the group it was a theme that they had worked with a lot, but could not grasp and at the session they were given a link to how that theme could work in their final concept (Appx. 9: 1802-1806). They used the session to focus their work and select their final concept. Team D used the counselling sessions to test and validate their ideas. Figure 15 illustrates that they went from five prototypes to three selected ideas that they prototyped. *"We spend the afternoon yesterday to develop the five concepts and chose the three best after our meeting with Julian giv-*

Figure 19 *Day 12-14 - Team A, Team B, Team C & Team D.*

ing feedback. He told us that two of the concepts was not doable" (Appx. 9: 1750-1753). In one of the other expert sessions they spend time on technicalities such as material, cooling and wear (Appx. 9: 1655-1658). As with team A there is a correlation of themes discussed at the sessions to their final prototype. Team C also used their sessions to validate and test their ideas and they discussed detailed technicalities about function, design and how it relates to principles in nature (Appx. 9: 1572-1604). Whether or not it had as large an affect as the other groups can be discussed as they were already focused on the themes that they discussed during the session. In addition, team B also showed sign of convergence, but there is not any direct correlation with what they discussed at the session to
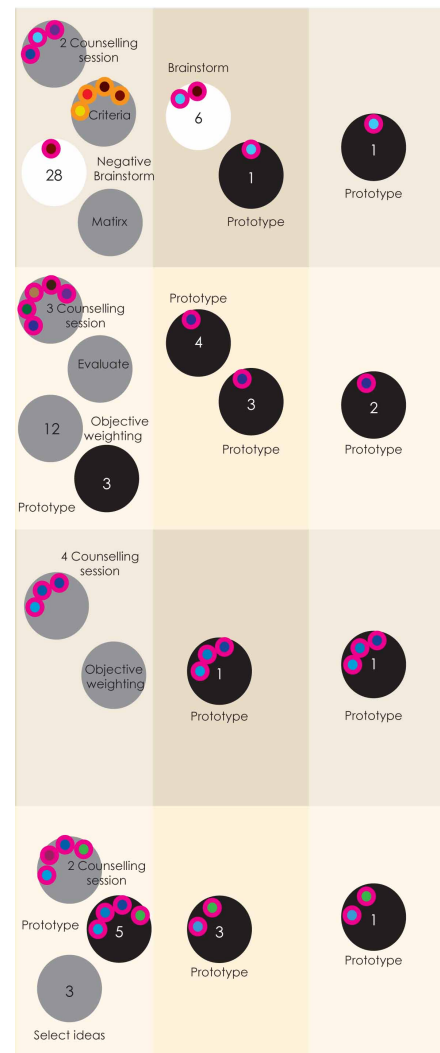
their final prototypes. This can be due to the fact that they during the session either got general feedback, as they did not have something concrete to get feedback on, or they got rejected some ideas that they presented to the experts and did not get the same "confirmation" as other groups got from the experts sessions (Appx. 9: 1605-1630).

5.1.6 Trend 6: Developing and externalizing ideas

In regards to developing and externalizing ideas, the groups developed different patterns of using the tools to do so. The difference becomes clear when comparing how team C and Team A utilized prototyping in the processes. Team C started the prototyping at an earlier stage and used it steady once they started, where team A used it more extensively in the end of their process. In figure 20 it shows that team C prototyped within the same three themes, where team A only prototyped within one theme in
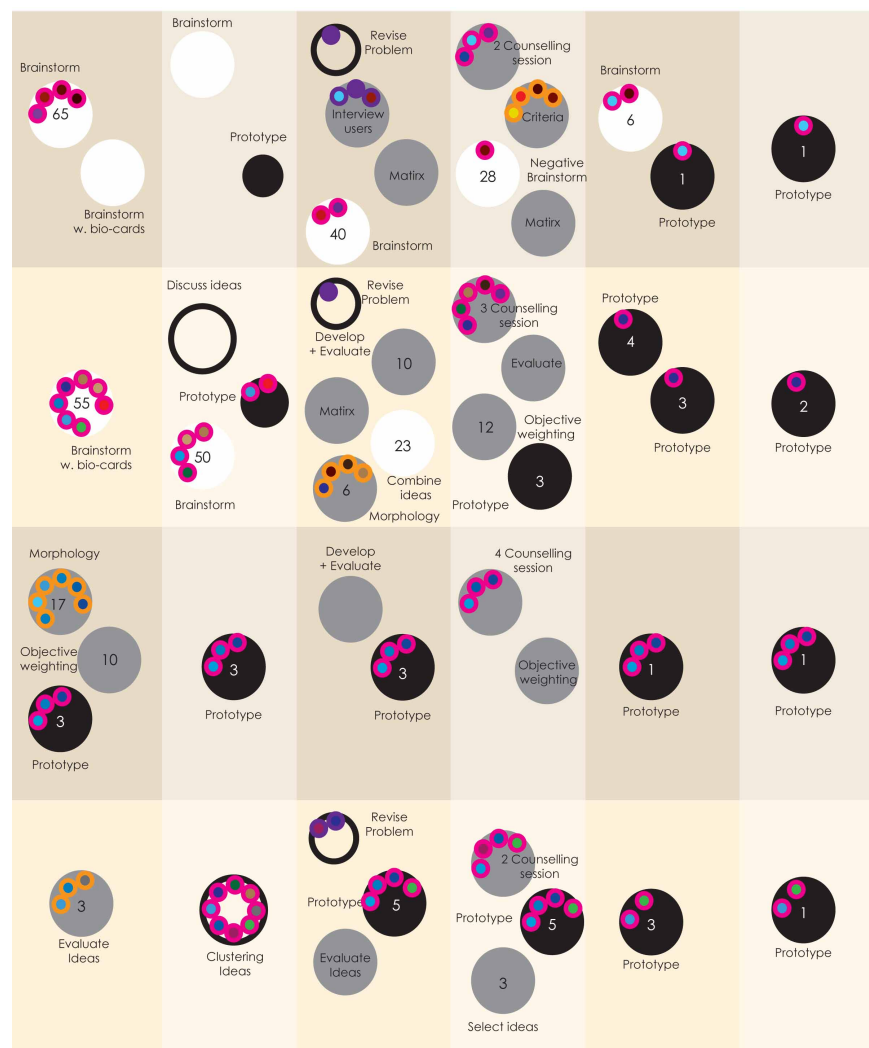

Figure 20 *Day 9-14 - Team A, Team B, Team C & Team D.*

the end of the process. This could be an indication of using prototyping in different ways. Where team C used it to explore their ideas, team A used it to create their final concept. The different patterns in their prototyping can be lead back to the fact that team C were to work with a product that already existed and team A were to work with a concept that did not exists. This could in addition be the reason why team C's prototypes had similar

shapes as the product that they were to work with. It made them focus earlier in the process, and it can be argued if it can be a sign of early fixation within team C, as they started the development of prototypes that had similar shape as the product they were working on. In addition, company X brought their physical product to the students and it was present during the entire process and this could also have an influence in regards to the group prototyping ideas similar to the existing product.

Besides doing physical prototyping, team C in addition worked with very detailed and technical sketches throughout the process (Appx. 11). Team A did not work with sketches to the same extent, but went directly to the physical prototyping when developing their idea. Students from team C express that prototyping was useful for them in the sense that they learned about the function, the heating system and the friction (Appx. 9: 995-997). They also went to an innovation lab at day 13, to develop their concept with better resources. When they came back from the lab one of the students expressed: *"It was like the first time our idea met reality"*, and they were again challenged in what their concept could do and what it could not do (Appx. 9: 1866-1869). Exploring the function was not as important to team A as they were developing a concept and not a product.

5.2 Innovation – Tracks

In the former part of the analysis creative process concepts have been translated into trends, and this section has the purpose of coding these trends into conceptual tracks. This is done in order to understanding how the creative trends correlates with the innovation tracks that the groups are going through.

As with the creative exercises an analytical tool has been developed, based on the empirical data, to visualize and communicate the findings relating to the innovation tracks. Please see enclosed appendix 13 for a larger version of the innovation tracks. This appendix is printed in transparent film, which provides a possibility to read both the creative activities and exercises with the innovation tracks.
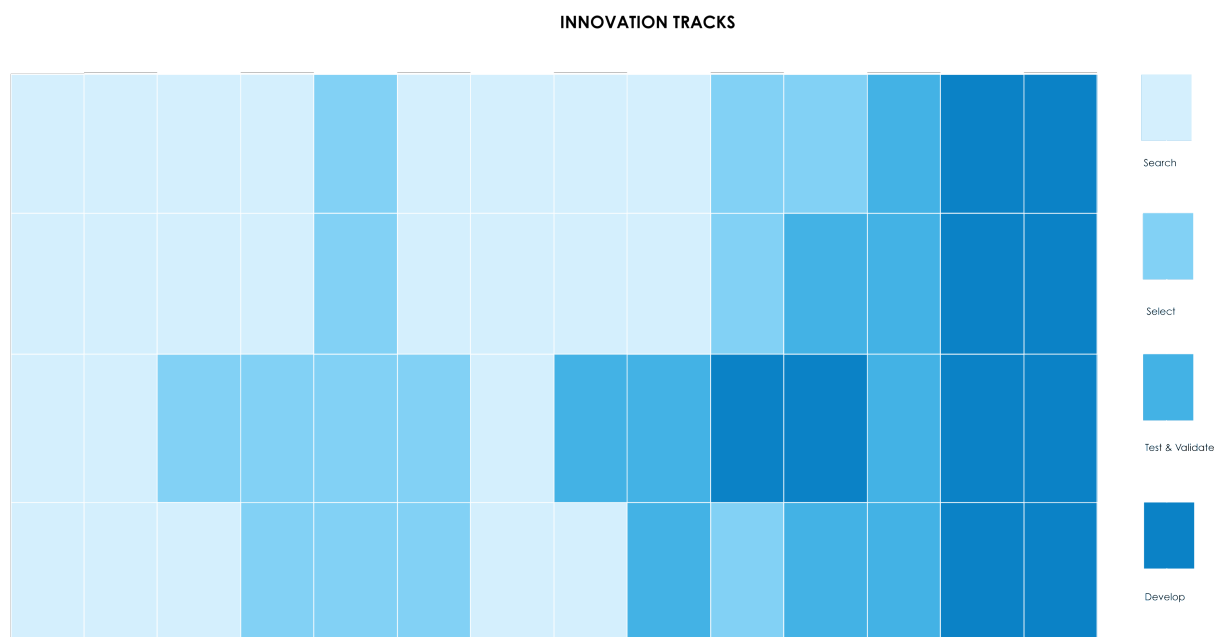

Figure 21 *Innovation tracks*

5.2.1 Track 1: Search

From figure 22 it is clear that team A and team B worked in the search phase for a longer period of time than team C and team D, that were in the search phase for shorter time before entering the selection phase. The difference can be explained by the difference in problem structure and space found in trend 1. The fact that team A and team B were dealing with a rather
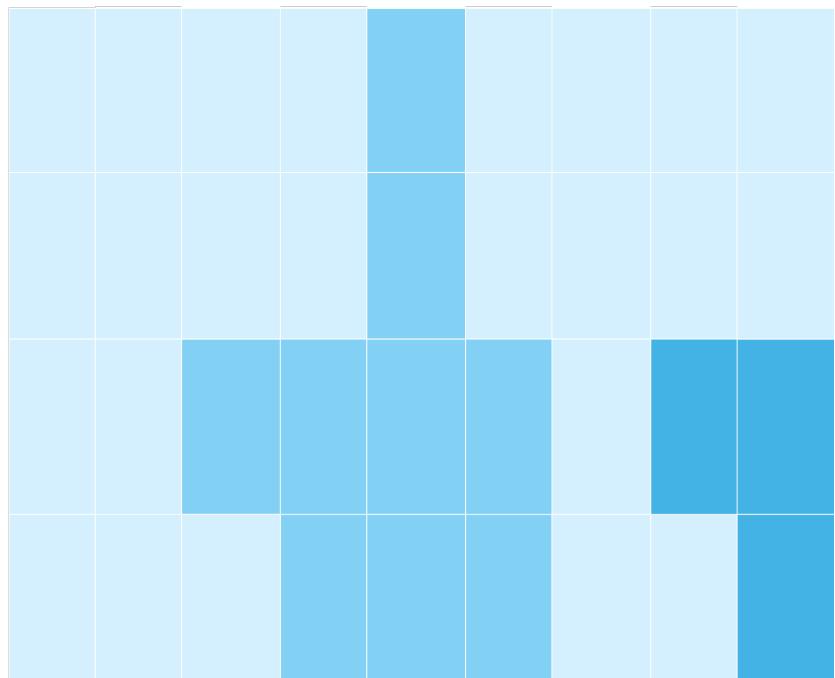

Figure 22 *Day 1-9 - Team A, Team B, Team C & Team D.*

abstract problem that they had difficulties to grasp, lead them to spend longer timer on figuring out what to focus on, kept them in the search phase for a longer period. Opposite team C and team D, that were dealing with a rather closed and technical problem starting focusing at an earlier stage, which lead them faster into the selection phase. In trend 2 it was also identified how team A and team B was utilizing creative exercises for a longer time than team C and team D, which has the effect of a narrower search phase.

Even though team C and team D entered the selection phase earlier, they went back to the search phase at day 7. This can be seen as an effect from the scheduled brainstorming and prototyping day that was identified in trend 3. The fact that they had to engage in the creative exercises forced them back into the search phase where they discovered new themes that had not occurred earlier in their process. Team A and team B were already in the search phase at the time of the scheduled brainstorming and prototyping day, so it had no visible effect on how their innovation track progressed.

5.2.2 Track 2: Select

In figure 23 it is seen how the teams had much different selection tracks. Team C and team D enters the selection phase at an early stage and team A and team B goes through the selection phase at day 5 and revisits the phase again at day 10. As mentioned team A and team B were rather divergent and kept looking for signal to respond
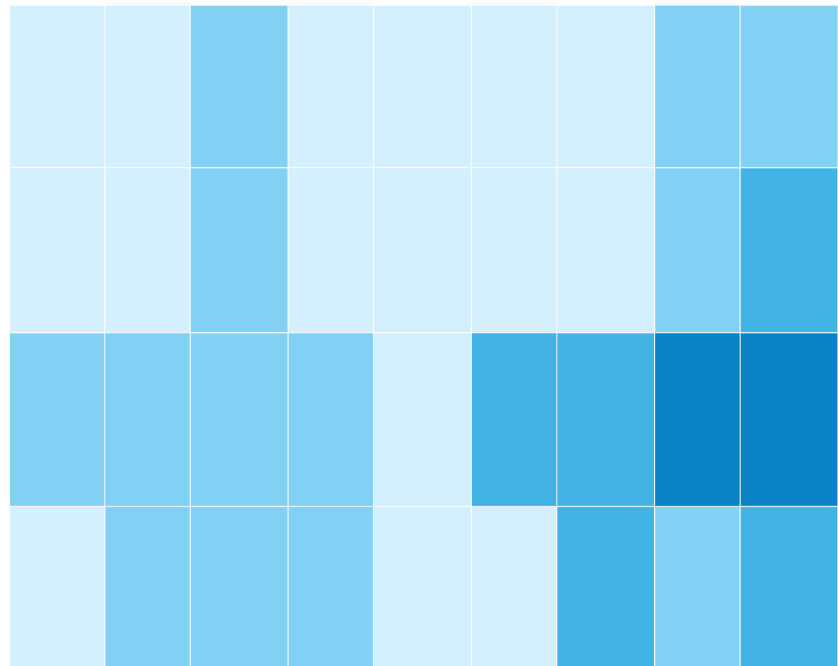

Figure 23 *Day 3-11 - Team A, Team B, Team C & Team D.*

to. Their selection stages can be explained by the fact that they had to accommodate the external deliverables, which had objectives that they had to present at day 5 and day 10. This was observed in their structure of their work, when making explicit agendas working towards the deliverables (Appx. 9: 1013-1026; Appx. 11). Even though they had an open problem and solution space, the external deliverables forced them into the selection phase where they had to make a decision to choose something to present.

Another factor that relates to team A, team B and team D going from search phase to selection phase at day 10 is the lecture *introduction to idea and concept development*. It was found in trend 4 how the lecture in introduction to idea and concept development was useful for convergence as it catalysed the use of evaluation exercises. It was useful as there were a lack of skills amongst the students to do proper selection. Amongst team A and team B, this missing skill was present at many occasions. After a brainstorm at day 6 with team A and team B the following was observed: *They do not know how to select. One says, "Should we just discuss until we reach an agreement". They then pick a problem each (…) After the session I ask them "How did you select ideas from the brainstorm?" One of the students looks confused at me and says, "Well we discussed it together".* (Appx. 9: 862-872). It was also present when team A was brain-walking with bio-cards at

day: *"There is a tendency of selection that is forming when they are going through the boards. It is the student that is holding the pen and the most dominating that does the selection while they are discussing. In addition, it is not clear what they are selecting for and how they will use the selected ideas later. It is not the first time I have seen them do this after a brainstorm"* (Appx. 9: 1169-1175). They are missing the right tools to select and are using what comes most natural, the ability to discuss. Opposite team D started the necessary exercises to select before the lecture (Appx. 12) as they al ready knew them. This could explain why team A and B enter the select phase later, as they are in need of the tools to do so.

5.2.3 Track 3: Test & validate

Figure 24 illustrates how all the groups had rather different testing and validation tracks. Team C started the testing and validation at day 8 and team D followed at day 9. Team B started the phase at day 11 and team A was the last group to enter the stage at day 12.

In trend 4 it was found, how the teams performed evaluation exercises in order to test their ideas within day 11 and 12. These exercises were an effect of a feedback session that they had on day 10, which amongst other things generated *revision of problem*. However, it is only team B and team D that entered the validation and selection phase when revising the problem. In trend 5 it was found, how all

Figure 24 *Day 8-12 - Team A, Team B, Team C & Team D.*

the groups except team B, used the expert session to validate their ideas based on the knowledge input they received and this can explain how team A and team C shifts from either select or develop into the testing and validation phase. Team B and team D was already in the testing and validation phase so even though the effect of the counselling session showed to have a great effect in trend 5, it did not have a major effect when looking at how their innovation tracks proceeded. It is interesting to see how team A have
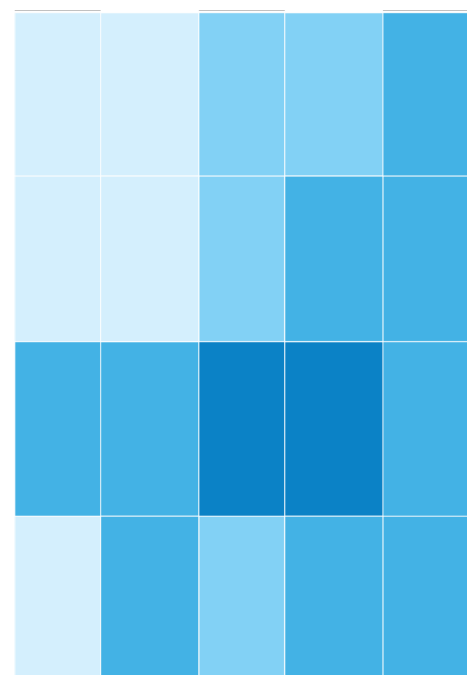
such a short period of testing and validation, and it can be explained by the fact that they had spent the most time in the search phase figuring out what the problem was and how it could be solved, and had little to test and validate.

When detecting behaviour for *selecting* and behaviour regarding *testing and validating* ideas, it has to be mentioned that separating the two tracks is rather complex as day 10-12 pointed towards both types of behaviour, which made the tracks difficult to separate. E.g. when the groups used the feedback and counselling session to validate and test their ideas and concepts, they did, at times, use the input to an extend that almost appeared as external selection. One of the students describes the feedback session as: *"Very nice to get perspectives. However, it was mostly seen as 'the teachers confirming or rejecting' ideas, concepts, directions and that being 'the correct thing' which should be followed. The teachers' words were law"*(Katapult in press.). It can be discussed whether the tracks should be labeled as testing and validating or in fact external selecting.

5.2.4 Track 4: Develop

Figure 25 illustrates how the development tracks in the groups progressed. Team A, team B and team D had rather similar development phases when detecting behaviour where the groups were externalizing and developing their ideas or concepts. Team C had a rather different development track as they started the phase at an earlier stage than the other groups. This can be explained by difference in how the groups utilized prototyping found in trend 6. It was identified how team A used prototyping for creation and team C used it to explore their ideas. Although, it was found in trend 6 that the use of prototyping correlated with developing a concept, that not necessarily had to function properly, and developing a

Figure 25 *Day 10-14 - Team A, Team B, Team C & Team D.*

product that can be tested physically. It can be discussed whether the innovation tracks

can explain if this correlates or not. This is due to the fact that team D also enters the development phase at the same time as team A and team B, having a product to test. It can be discussed if team D entered the development later as they were slightly more divergent than team C, when covering other aspects not relating to the product.

All the groups directly went from testing and validation at day 12 to development in day 13. As mentioned in track 3 and trend 5 the counselling session worked as a 'confirmation' for the majority of the groups, which can explain how the continues into the development phase after being given a 'go' from experts within the fields.

5.3 Practical relation between creativity trends and innovation tracks

From my empirical findings I found how 6 practical trends within creativity, related with 4 practical tracks in the groups' innovation tracks.

In *trend 1: Exploring problem* it was found, how the teams generated different patterns in exploring and focusing their initial problem. The broader the problem space, the more divergent the groups became for a longer time in the phase of exploring the problem. This showed to have an effect in the teams' innovation *track 1: Search* as the time spent in the search phase correlated with how broad or narrow the problem space was. The groups with broad problem space stayed in the search phase for longer than the groups with narrow problem space. *Trend 2: generating problems and ideas* showed additionally to have an effect on the groups' *track 1: search* phase. The trend showed how the teams generated different ways of utilizing idea and problem generating exercises. Where two of the groups used it early in the process to front-load problems and ideas in their divergent stage, the two other groups used it throughout the process for both diverging and converging. The groups that stayed in the search phase for shorter time front-loaded their idea and problem generating exercises, where the two other groups used them throughout the process. In *trend 3: Exploring methods* a sudden shift in activity was identified, which made all the groups divergent regardless of where they were in the process. Some of the exercises showed to have a strong effect when making analogies and utilizing nature if bio-cards were made before hand. The trend also showed how structure could be

effective for being divergent. This trend had an effect for especially team C and D as they were forced back into the search phase.

Trend 4: Validation of ideas and problems illustrates how the feedback session and the introduction to tools for evaluating ideas and concepts generated a convergence. It is possible that some groups would have converged earlier if the had been introduced to the tools at an earlier stage. This had a large effect for some of the groups as the entered the *track 2: Selection* at a later stage, than the groups who had the skills and used them when needed. In addition, the external factor of meeting the required deliverables forced groups into the selection phase even though they were in the search phase.

Trend 5: External knowledge input illustrated how the counselling sessions with experts had a rather strong effect on the majority of the students creative process, with directly correlation to *track 3: Test and validate* with the focus, testing and validation that occurred at the session to their final idea. This had a rather strong effect on the process as the groups could get the experts perspectives on their developed concepts and ideas. In addition, *trend 4: Validation of ideas and problems* had an effect with the introduction to evaluation tools that were used for testing and validating the ideas.

In terms of *track 4: develop* it was found, how *trend 6: Developing and externalizing ideas* had an effect of how the groups entered the development phase at different stages. The trend showed how different patterns in using prototyping correlates with exploring a physical product, which has a physical function, or creating a concept that not necessarily has to function when developing. The groups that used prototyping to create entered the track at a later stage. Although, it was only one of the groups developing a product that entered the track at an earlier stage. In addition, *trend 5: External knowledge input* had an effect as it was utilized as a 'confirmation' towards which concepts they should proceed with and start to develop.
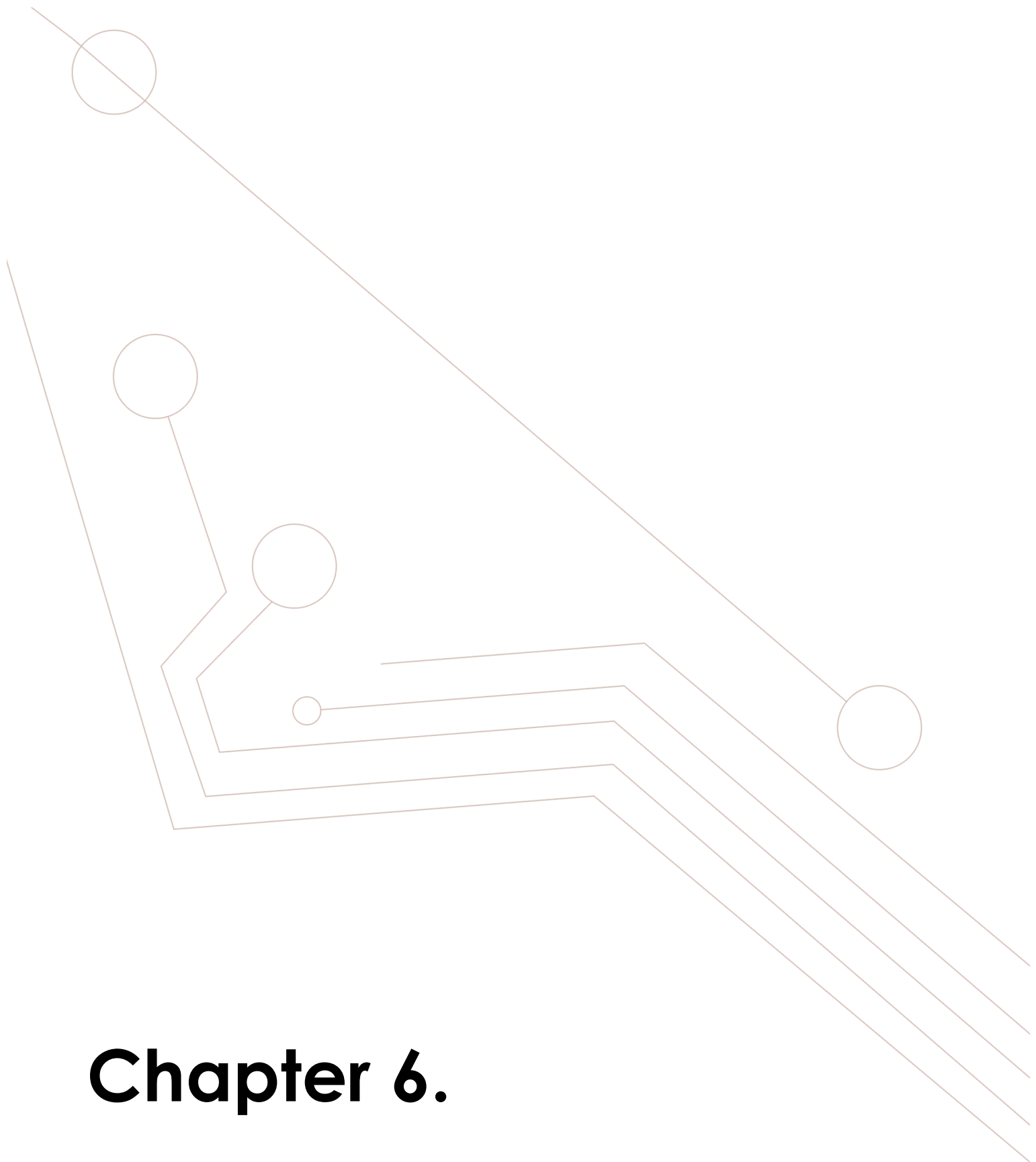
Chapter 6.

Discussion

This section serves to answer the research question; *how is creativity influencing and affecting the innovation process at the summer school 'Innovation Inspired by Nature'?* This is pursued by discussing the findings from the theoretical explorative analysis with the practical findings from the empirical case. Similarities and differences between the two will be explained through synthesized themes.

6.1 Problem exploration

In practice the element of creativity showed to have different effects on the innovation process, which the different groups went through. In the beginning of the process, where the groups were proposed to different types of problems, which had different kinds of purposes, it was clear that the utilization of creative exercises became different for the groups. In the empirical findings it had great importance for the use of creative exercises and the innovation process, whether or not the teams started out the process with either a *defined* or *ill-defined problem* relating to product or concept. This starting point had an effect of how the groups progressed in the innovation tracks and how they used the creative exercises within the tracks. Having an open problem allowed teams to be more divergent and their innovation process progressed in slower pace. In the theoretical framework these different starting points are not entirely explained in the same way. The theoretical creative innovation process explains it as a generic and divergent problem finding phase where the environment is scanned in order to pick up on potential problems. The theoretical framework does not differentiate between the nature (product or concept) of problems occurring in this phase. Instead the theory focuses on whether or not the problem is pre-defined, as finding a problem is essential, hence it will lead to task motivation, which will determine how 'far' the individual will go and how involved the individual will be in solving the problem. In the empirical findings there were found signs towards challenging the companies' expectations and the introduced problem (Appx. 12), but there were no clear signs or trends for whether this had an effect for the process or not. This has also something to do with how creativity was operationalized in this study. Traces of task motivation could have been found with a different methodological focus.

In the empirical findings this problem-exploring phase was similarly to the theoretical framework's starting-point of the process, where the groups started to diverge in the problem space. Thus the practical exploration of the problem varied depending of the nature and the framing of the problem. The groups that were dealing with a closed problem relating to product had a much shorter phase, than the groups with a more open problem relating to a concept. The theoretical framework lacks insights to the scope of the problem, as it will determine how long this phase will continue before the process will progress into the next stage. In the framework this phase is isolated in the beginning of the process, but in practice it was found, how three of the groups went back to a short version of the phase with a revision of their problems.

6.2 Acquire knowledge

In relation to acquiring domain specific knowledge, which is an important part of the theoretical framework, as it will provide a fundament and familiarness to the field, the empirical findings comes short. This was due to lack of access to any qualitative pre-requisites for the observed students. It was only clear what line of study and university they were enrolled in. The practical data did not allow seeing if they already were familiar with the domain, and if they got more familiar by acquiring domain specific knowledge. It can be stated that they participated at the lectures that were to provide them with domain specific knowledge, but whether they actually learned something I am not in a position to judge. The importance of acquiring knowledge can therefore only be explained in terms of the theory, but not in this specific empirical study.

6.3 Idea generation

In terms of idea generation the empirical findings showed how the creative idea generation had different effects on the innovation process. The practical relation between creativity and innovation both supports and contradicts the theoretical understanding of idea generation. In terms of labelling the phases, the idea generation is practically happening in the track called search and in the theoretical framework it has its own phase called developing ideas / responses. However, it is the same type of behaviour that was found in the mentioned phases. In practice it was found that across the groups it was not an isolat-

ed phase that happened at the same time with same type of behaviour. In the theoretical framework the behaviour is solely recognized as divergent. In practice it was both divergent and convergent. For the groups that progressed faster in the process the idea generating exercises was frontloaded in the beginning of the process and they served as a divergent tool. However, the groups that had difficulties to find focus were using idea generating exercises throughout the process for both divergence and convergence. There is difference in the practical application of these tools between the groups, compared to the theoretical understanding of how to utilize these tools in the process.

In practice it was found, how team A and B diverged more in terms of developed ideas and problems within their respective fields. Going back to creativity theory this divergent thinking is explained by cognitive abilities, which allows individuals to diverge in the problem or idea spaces. In terms of theory, it can be discussed if individuals in team A and B had better abilities to perform this divergent behaviour or if they rather were better at utilizing their cognitive abilities. However, it has to be mentioned that the theoretical term of analogical thinking was identified on more occasions within team C and D, as they generated and translated direct analogies between the field of inspiration and their developed ideas. Theory does not provide an obvious explanation of why these creative cognitive abilities are used in different ways. However, with the empirical understanding it is arguable that team C and D had better premise of making analogies to something more concrete as a product and team A and B had a better premise of performing more divergent behaviour when working with a concept.

The theoretical framework suggests iterations between idea generation and select & validating, to provide possibility to revise the ideas. In practice the iterations happened differently. All the groups had iterations where they went from search to select and then back to search. Although, when it came to evaluating their ideas, the tools for these skills was back loaded in the end of the process. This can partly be due to the fact that some groups did not have the skills for performing proper evaluation and testing; and partly due to the fact of the time frame of the process. The observed process lasted for three weeks where they were forced to deliver something at the last day, which forced them to start testing in the end. If the process had a broader timeframe it could be possible that they would have had more iterations with time to test and revise their ideas, which the theoret-

ical framework propose. However, there was found iterations relating to problem as revision of problems in the majority of the teams.

6.4 Selecting, testing & validating

In the theoretical framework *Step 4: Select & Validate Idea* constitutes convergent behaviour where ideas are evaluated, selected and validated on the basis of criteria made from domain specific knowledge. In practice these convergent types of behaviour was divided into select and testing & validating for the sake of creating focus. Thus, these elements seemed as interlinked as proposed in the theoretical framework, as it was turned out to be a complex matter to differentiate between the two when this type of behaviour was observed in the end of the process. The theoretical framework has a more useful way of explaining this part of the process with a more generic scope on how this will occur in the process. As already mentioned, the theoretical framework suggests iteration between generating ideas and testing. In practice the groups with open problem structure went through this stage in the end before progressing into develop, and one other group had iterations between testing and externalizing the ideas.

The theory in addition explains how ideas shall be tested based on criteria that are created from domain specific knowledge, and if that knowledge is not established internally, it has to be revised by externals. This use of externals was directly found in the empirical analysis where many of the groups used experts and other externals to test their ideas and problems. It was also found, how they heavily relied on these experts, which at times translated into selection by externals instead of solely using the feedback to challenge the ideas. Going back to Sawyer (2012)'s understanding of evaluation, he express that there is a tension between evaluating appropriateness and originality. These terms are interesting when discussing the effect of the teams utilization of testing, validation and evaluation activities as team C and team D was proposed to a problem by a company that valued appropriateness higher than originality. This could have an effect on how the teams dealt with the problem and how they worked with the case in order create something that met the values of the company. According to Sawyer (2012), evaluation is related to creativity as it will determine the novelty of the selected ideas, and this could explain why the groups did not go as far in terms of generating as many ideas as team A and team B.

Where the theory focus on knowledge that are domain specific, the practical findings in addition show how tools, which I will argue are domain general, was important to start the selection process. Some groups where lacking simple tools to enter this stage earlier, as it was not apart of their skillset. This practical lack of skills had an effect of expanding the divergent part of the innovation process. It is not only important to have a collected pool of skills that generates divergent behaviour, but in addition convergent behaviour. The lack of convergent abilities in group A and B can explain why they started to utilize creative exercises such as brainstorms for convergence, instead of only using 'proper' exercises for this stage.

6.5 Externalization of ideas

In the theoretical framework the process ends with an externalization of the idea. In practice this was also the case for all the groups, but the track happened much differently. For one of the groups the externalization was used as a way to explore, where one of the other groups used it for creation. Even though this stage is placed lastly in the theoretical framework, the focus is on externalization as a form of exploration, where this factor helps individuals understand the potential and the function in a deeper way. In practice this was solely the case with the groups that were prototyping a product as they had a function to explore. The groups that were working with a concept did not have a specific function to explore and externalization was used in a way to visualize their final concept. The theoretical framework lacks explanation in regards to type of innovation, which is pursued, as it will change how externalization of ideas practically is applied in the process. The practical aspect of innovating a product also had effects on the times at which groups entered this stage, as the exploration stage translates into starting the externalization process earlier and not only in the end of the process.

It is interesting to see that the groups who started prototyping earlier stopped using creative exercises earlier as well, where the groups that used creative exercises throughout the process entered the prototyping later in the stage. It is two different ways of working with creativity where one is more focus on words in brainstorms and the other is translated into physical objects. Creativity is still present throughout the teams' processes, it just changes its nature and application.

_{6.6} Structure

When going back to innovation theory it is noteworthy to see how some of the structural elements for e.g. the stage gate model's *no go/ go stages* resembles some aspects found in practice. The feedback sessions was used as a confirmation / rejection stage, where the students changed their direction based on what was said to them. The deliverables that was a great part of the constructed structural elements had a great effect on how the process evolved, it had a greater effect on the innovation process as it forced them through the process. Thus it also had an effect on creativity as they changed the use of creative exercises when dealing with specific innovation stages. It was also found how structure was effective for the creative day as the students could let go and just be creative. The element of structure is important for both the creative elements and the innovation tracks as it serves to shape how it is occurring.

One of the aspects that were critical in theoretical framework was the element of time, as the model could not show how time was a factor in real life. Naturally, it showed that the groups did not utilize the same exercises at the same time. In addition, the amount of time spend in each phase was also different from group to group. The development in time across the different groups was very dependent on the fundamental starting point, when exploring an open problem that is challenging to grasp or a closed problem with a physical nature.
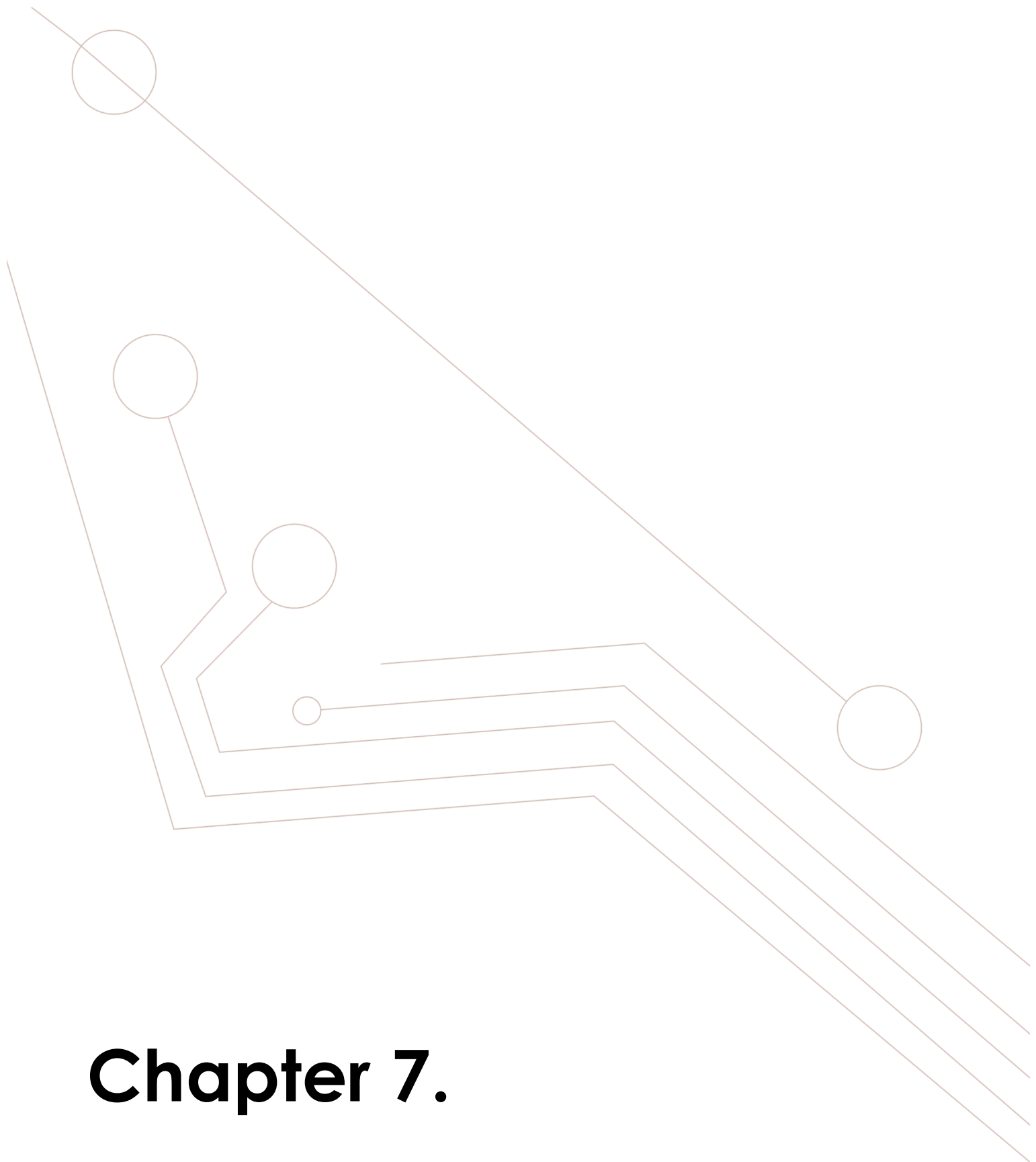
Chapter 7.

Conclusion

This study was designed to explore insights related to the 'missing link' between creativity and innovation. This problem was found when researching upon practical examples that lacked evidence to support the theoretical understanding of creativity being important for the innovation process. This was done by investigating how creativity unfolded in the innovation process of the empirical case 'Innovation Inspired by Nature 2013'. The aim was to gain an in-depth understanding of how creativity affected and influenced the innovation process in this specific context. This would hereby contribute with new knowledge that can bring researchers and practitioners closer to understanding why and how creativity is important for the innovation process.

7.1 Synthesis of findings

To pursue the aim of this thesis the current theoretical understanding of the creative process and the innovation process was explored and integrated in a theoretical manner. On the basis of the findings from the theoretical analysis it can be concluded that:

- When **combining the theoretical creativity and innovation process models implications occur** in their differences of pursuing a process. The process models have different aims, approaches to utilize knowledge and understandings of what is happening in the different stages when progressing towards the aim.

- A combination of the theories has been made possible through an **explorative theoretical framework** that consist of five stages, which constitutes a combination from both perspectives. However, details were lost in the process of synthesising the models into one framework. The framework is therefore only of explorative nature.

- The theoretical framework has challenges for **practical application** due to its explorative nature and their different perspective of the process. The aspect of time and weigting of the different phases is conceptualized, which can challenge the practical application.

In addition, an empirical study was conducted to explore how the creative process occurred in relation to the innovation process in practice. On the basis of the findings from the empirical analysis it can be concluded that:

- In practice it was found how the difference of dealing with either a **broad or narrow problem space,** relating to either **product or concept**, generated different patterns for divergence. The broader the problem space, the more divergence and the longer time spent in the search phase of innovation.

- **The broad or narrow problem space** also made a difference in regards to whether the use of creative exercises was front-loaded in the beginning of the process, or if they were used throughout the process.

- The **counselling sessions with experts** showed to have a rather strong effect on the majority of the students' creative process, with direct correlation to the innovation phase testing and validating ideas. The students used the experts' perspectives on their developed concepts and ideas.

- The **introduction to tools for evaluating** was also found to be effective as it catalysed behaviour for convergence, and made the groups progress in the innovation process.

- In the empirical findings it was found how **different patterns in using prototyping** correlates with exploring a physical product, or creating a concept that not necessarily has to function when developing. The groups that used prototyping for creation entered the track at a later stage. However, it was only one of the groups developing a product that used prototyping for exploration, which entered the development phase of innovation at an earlier stage.

7.2 Contribution

These findings collectively contributes to an understanding of how the creative process affected and influenced the innovation process at 'The Innovation Inspired by nature Summer School 2013', based on practical and theoretical explanations:

- In the empirical findings it had great importance for the use of creative exercises and the innovation process, whether or not the teams started out the process with either a *defined* **or** *ill-defined problem* **relating to product or concept**. The theoretical framework lacks insights to the scope of the problem as it will determine how long this phase will continue before the process will progress into the next stage. In the theoretical framework these different starting points were not considered in this way, and practice and theory explain this phase differently. The theoretical framework emphasis on task motivation when determining for how 'far' the individual will go and how involved the individual will be in solving the problem, but there were no clear signs or trends for whether this had an effect on the innovation process or not.

- In practice it was found that across the groups the **idea-generating phase was not an isolated phase** that happened at the same time with the same type of behaviour. In the theoretical framework the behaviour is recognized as divergent and in practice it was both divergent and convergent. For the groups that progressed faster in the process, the idea generating exercises was frontloaded in the beginning of the process, and they served as a divergent tool. The groups with challenges to find focus were using idea generating exercises throughout the process for both divergence and convergence. Therefore, there is difference in the practical application of these tools between the groups, compared to the theoretical understanding of how to utilize these tools in the process.

- In practice **testing & validating** was divided into separate phases for the sake of creating focus. Thus, these elements seemed as interlinked as propose in theoretical framework. The theoretical framework has a more useful way of explaining this part of the process with a more generic scope on how this will occur in the process.

The theory explains how ideas shall be tested based on criteria that are created from domain specific knowledge, and if that knowledge is not established internally, it has to be revised by externals. This use of externals was directly found in the empirical analysis, where many of the groups used experts and other externals to test their ideas and problems, which at times translated into external selection instead of using the feedback to challenge the ideas.

- In the theoretical framework the process ends with an externalization of the idea. In practice this was also the case for the groups, but the track happened much differently. For one of the groups the externalization was used as a way to explore, where one of the other groups used it for creation. In addition, the theoretical framework focuses on using **externalization as a form of exploration**, to understand the potential and the function in a deeper way. In practice, this was merely the case with the groups that were prototyping a product as they had a function to explore.

7.3 Further research

In this study new interesting aspects appeared to inspire new paths for research. These needs to be addressed as they either appeared due to new insights or due to delimitations that occurred from the chosen focus.

7.3.1 Structures

In the empirical analysis there were found some structural elements such as external deadlines and planned sessions, which indicated to have influence on both the creative idea generation and the development of the innovation process at large. Neither internal structure in the groups or external structures were set to be the focus point for this thesis, but their relevance could not be avoided when conducting the research. It is suggested that further research can be conducted in regards to this matter. A study with this focus would change the perspective on creativity to the understanding of *press* (see Rhodes' 4Ps pp. 31). Here the surroundings, which constitute structures, be the object of study. It will be interesting to dive into which kinds of structures that are present in such a study, what

their characteristics are and how effective they are to both the creative process as well as the innovation process.

7.3.2 Knowledge

One of the aspects that in this study could not be fully explained by the data was knowledge, as I was not in a position to judge whether or not the students actually learned anything and if they used it in the right way. This could be investigated further through test and interviews with the students. These tests would be judged by experts from the field that would have the authority to judge the domain specific knowledge. The test could be designed to occur through the process, to measure how the extent of domain specific knowledge had an influence on creativity and innovation. This could generate value, as the term of knowledge is both an important part of creativity and innovation theories.

7.3.3 Interdisciplinarity

One of the characteristics of this study that was intentionally eliminated for the sake of creating scope, was the interdisciplinarity amongst both a diverse craw of students, lecturers and facilitators. This is a factor that can be investigated further in order to show how the diversity contributed to both the creative process and the innovation process. By looking further into how the teams were constituted across various disciplines, insights could be explored in regards to how interdisciplinarity affected utilization of creative exercises and the innovation process at large. In regards to the diversity of facilitators and lecturers it would be interesting to see how their different teaching styles and facilitation techniques would influence the creative work and how they progressed through the innovation process.

7.3.4 Other contexts

This study was conducted with a focus towards one specific case and further research for opening up other contexts would provide new rich insides. Firstly, other processes rooted in the field of education, such as other summer schools, could provide a comparison of the findings, where it would be possible to investigate if the same or different occurring crea-

tive trends and innovation tracks were happening. By approaching this as a pilot study, gained knowledge can be used and compared in further studies. Secondly, the findings could be translated into more corporate settings. Here it could be investigating how the elements of creativity and innovation would occur in a setting, which was not as constructed as the chosen study.

7.3.5 Outcome

In this study process was the topic of focus as the case had an open-ended outcome. It was not be possible to detect whether or not this process would have an actual outcome ready for implementation. This was due to the aim of the process for students to gain new knowledge and the time frame, which did not allow an implementation to happen. To go deeper into the question concerning if creativity is useful or not for innovation, this would be of interest for further research. This could be looked into, with an evaluation from experts from the field that would be willing to implement the outcome to test the success rate. This would require a case with a much longer time frame, and a purpose that pursued more than learning. A purpose of generating an outcome that was supposed to enter the market.

7.4 Concluding remarks

This study has been driven by a motivation of gaining new insights that are related to the missing link between creativity and innovation. Through a new perspective and rich insights in practical execution of creativity in an innovation process, this study has generated new relevant aspects to both researchers and practitioners within the fields of innovation and creativity. These aspects can be of use in future studies for a further investigation of how creativity is important to innovation processes. With the study it can be concluded that creativity had various effects on how the innovation process develops, which showed to be a complex matter with no rigid answer to how and why creativity is important for the innovation process, as it was dependent on many different practical elements. So even though creativity and innovation has been separate field and just recently have been brought together, I see reason and value to integrate them in practice and theory, as it is found, how effective creativity can be to an innovation process.

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Appendix

Appendix 1 *Course Description*

Innovation - Inspired by Nature Sommer 2013 - LFKK10412
Course Description 2012/2013

Responsible Department Department of Agriculture and Ecology
Earliest Possible Year MSc. 1 year to MSc. 2 year
Duration Outside schedule
 Credits 7.5 (ECTS)
Level of Course MSc
Multidisciplinary course between KU, DTU and CBS as well as students from abroad.

Examination
Final Examination
written examination and oral examination
All aids allowed
Description of Examination: Written assignment Oral examination, 20 min.
7-point scale, internal examiner

Requirement for Attending Exam
Active contribution to multidisciplinary group work (reflection on group dynamics, the innovation process and communication).

Organisation of Teaching
The course will draw on the expertise from teachers affiliated to all three contributing Universities and/or faculties for lectures, exercises, expert panel and as facilitators.

Block Placement
Summer Course
Week Structure: Outside schedule, 9-30 August 2013

Language of Instruction
English

Optional Prerequisites
It is a multidisciplinary course where you will work in a number of functions and draw on a diverse set of experiences and knowledge and therefore it is difficult to specify recommended prerequisites.

Restrictions
Max 40 participants. The students have to send a 1 page application and a CV when they apply. Find further instructions on:
http://katapult.ku.dk/aktiviteter/summer_school_og_summer_camp/summer_school_2012/

Course Content

Throughout history, nature has continuously inspired humans to create better and new solutions to our problems. Among other things, it has inspired hunting strategies, modern technology, design solutions, business models, and even structures in social organization and communications. In the knowledge-driven societies of today and considering the big global challenges we face, innovation based on biology is becoming even more important in our transition towards a sustainable bio-based society. Innovation requires wedding multidisciplinary skills and competencies to imagination and thus demands that people from a variety of disciplines are brought together. This course will focus on innovative solutions inspired by nature in a multidisciplinary context. It will do so by bringing together both students and teachers from various disciplines with different interests, and from a number of educational backgrounds (natural resources, biology, biotechnology, engineering, humanities, management, design and so on).

Students will work together over three weeks to develop innovative solutions to real problems provided by companies, non-profits, or governmental organizations. Selected partners from the service industry, private or public companies will challenge a group of students to create new solutions inspired by nature to a specific problem, process or design. Each group will meet the commissioned holder of their specific assignment a few times during the course. Facilitators will accompany the meetings and classes in general.

Subjects that are major components of lectures and discussions during the course are:

• Biology, diversity and evolution
• Bionics and bio-inspired engineering
• Innovation and innovative design
• Commercialization strategies
• Ideation – what is an idea and a good idea
• Communication skills
• Team dynamics
• Multidisciplinary work

Teaching and learning Methods

The teaching and learning methods will include: Lectures, e.g. on biological organisms and systems - keystone to inspiration, bionics methodologies and innovation process. Exercise and practical assignments, e.g. on team work and communication. The major part of the learning will take place during group work where the students will have to develop an innovative model and learn how to work in a multi-disciplinary setting and how to unite the competences and backgrounds present in the whole group. Each student will be assigned to a group beforehand by the teachers taking into account their interests and background, Each group will have representatives from various universities and disciplines and each group will get a facilitator. In addition it will be possible for the groups to book consultant hours from a panel of teachers with different expretise. Furthermore, students will give and receive feedback on their project work and will practice communicating their ideas through intermediary pitch talks and final presentations on the development of their venture idea. Preparation: reading of literature handed out before couse start is needed.

Learning Outcome

The course will enable students to manage innovation processes based on inspiration gained from the plethora of highly evolved biological functions, systems and processes found in nature. They will gain a basic set of theories and tools in innovation and design. They will be able to create, select and transform ideas into e.g. a prototype, new process, design or method based on a specific assignment and they will be trained in multidisciplinary work. This will be complemented with knowledge on commercialization and implementation strategies for the problem providers from private, non-profit, or governmental organizations.

After completing the course the student is expected to be able to:

Knowledge

• Understand biology as a source for innovation
• Obtain an overview of concept and theory of innovation managements, innovation process models, exploitation and creation
• Understand how to manage e collaboration process in a multidisciplinary setting
Skills

• Read and interpret specific articles and textbook chapters
• Describe and categorize biological solutions according to a specific assignment/topic
• Distribute tasks and responsibilities in a multidisciplinary environment
• Communicate ideas clearly, concisely and confidently in writing and orally to stakeholders
Competences

• Find and explain the evolved solution of specific issues
• Transfer biological knowledge into innovative solutions
• Ability to discuss, evaluate and decide among creative solutions
• Explain innovation models and use novel tools for innovative creation
• Ability to make use of own and other persons' competences in multidisciplinary work

Course Literature

Course material consists of selected scientific articles and book chapters. Students are expected to identify additional group specific literature.

Course Coordinator

Annette Bruun Jensen, abj@life.ku.dk, Department of Agriculture and Ecology/Section of Zoology, Phone: 353-32662

Study Board

Study Committee NSN

Work Load

lectures

20

supervision

20

project work

120

practicals

20

examination

4

preparation

30

214

SUMMER SCHOOL 2013 INNOVATION INSPIRED BY NATURE
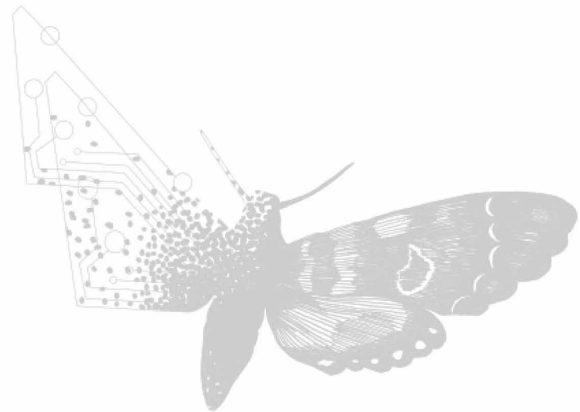
WEEK 1: INSPIRE

Monday 12th of August	Tuesday 13th of August	Wednesday 14th of August	Thursday 15th of August	Friday 16th of August
8.30-9.00 Team Meetings	8.30-9.00 Team Meetings	8.30-9.00 Team Meetings	8.30-9.00 Log book work	8.30-9.00 Team Meetings
9.00-9.15 **Welcome to the first week** 9.00-12.00 **How to understand and define a problem** By Balder Onarheim, Assistant professor, DTU	9.00-12.00 **Biomimicry Lecture 1:** *Search nature* By Torben Lenau, Associate professor, DTU	9.00-12.00 **Biomimicry Lecture 2:** *Understand nature* By Annette Bruun-Jensen, Associate professor, and Jacobus Boomsma, Professor, UCPH	9.00-11.00 **Innovation Lecture 2:** *Critique of innovation theory* By Daved Barry, Professor, CBS 11.00-12.00 **Cross-disciplinary lecture:** *The why, how and what not to do* Maja Horst, PhD, UCPH	9.00-12.00 **Innovation Lecture 3:** *Innovative workshop design* By Daved Barry, Professor, CBS
12.00-13.00: Lunch				
13.00-16.00 **The arts of process and planning** By Balder Onarheim, Assistant professor, DTU	13.00-16.00 **Innovation Lecture 1:** *What is innovation?* By Daved Barry, Professor, CBS	13.00-15.00 **Inspirational lecture:** *The creative mind* By Morten de Fine Friis-Olivarius, CBS 15.00-17.00 Work in teams	13.00-16.00 **Biomimicry Lecture 3:** *Apply principles from nature* By Phillip Cash, Assistant professor, DTU	13.00-16.00 Team presentation **Deliverable:** Problem understanding, contextual analysis and workshop design 16.00 Friday beer

SUMMER SCHOOL 2013 INNOVATION INSPIRED BY NATURE

WEEK 2: EXPLORE

Monday 19th of August	Tuesday 20th of August	Wednesday 21th of August	Thursday 22th of August	Friday 23th of August
9.00-12.00 On location: **Company work session** - Students facilitate workshop with the company	8.30-9.00 Team Meetings	8.30-9.00 Team Meetings	8.30-9.00 Log book work	8.30-9.00 Team Meetings
	9.00-12.00 **Workshop I:** *Idea generation* By Joakim Rex Chaos Pilot	9.00-12.00 Work in teams	9.00-12.00 Work in teams **Field studies:** *Investigate the potential*	9.00-9.30 **Introduction to idea selection and concept design** 9.30-12.00 Work in teams - Prepare presentation
Back at the Studio at 12.50				
12.00-13.00: Lunch				
13.00-16.00 **Welcome to the second week** Work in teams and meet with summer school facilitators *Bio cards development – finding solutions in nature*	13.00-16.00 **Workshop II:** *Introducing prototyping - as an explorative method* By Rune Rex, FABLAB TI	13.00-15.00 **Inspirational lecture:** *Are Trends Going Out of Fashion? A New Approach to Trend Studies using Botany as Inspiration* By Maria Mackinney -Valentin, Associate Professor 15.00-17.00 Work in teams	13.00-16.00 **Workshop III:** *The art of the good presentation* By Majse Garde, Dramaturg	13.00-16.00 Team presentation **Deliverable:** Innovation themes and prototypes
				16.00 Friday beer

SUMMER SCHOOL 2013 INNOVATION INSPIRED BY NATURE

WEEK 3: CREATE

Monday 26th of August	Tuesday 27th of August	Wednesday 28th of August	Thursday 29th of August	Friday 30th of August
8.30-9.00 Team Meetings	8.30-9.00 Team Meetings	8.30-9.00 Team Meetings	8.30-9.00 Log book work	8.30-9.00 Team Meetings
9.00-9.15 **Welcome to the third week** 9.15-12.00 Work in teams	9.00-12.00 **Counseling sessions** with bio experts	9.00-12.00 Work in teams	09.00-12.00 Work in teams - Choose one innovation theme to continue with	9.00-12.00 Work in teams - Preparing the final presentation
12.00-13.00: Lunch				
13.00-16.00 Work in teams with facilitators	13.00-16.00 **Counseling sessions** with bio expert Julian Vincent	13.00-15.00 **Inspirational lecture by Julian Vincent**, Honorary Professor of Biomimetics, University of Bath 15.00-17.00 Work in teams	13.00-16.00 Work in teams	13.00-16.00 **Team presentation** Case companies are invited for presentation of final concept **Deliverable:** Final Concept and prototype 16.00 Friday beer and party

Appendix 3 *Students*

1	CBS	Organizational Innovation and Entrepreneurship
2	CBS	Cand.Merc Innovation and Business Development
3	CBS	Finance and accounting
4	DTU (PhD-studerende)	Mechanical Engineering
5	DTU	Design & Innovation
6	DTU	Design & innovation
7	DTU	Design og Innovation
8	DTU	Design og Innovation
9	DTU	Design og Innovation
10	DTU, MEK	Design and innovation
11	DTU	Design and Innovation
12	DTU, Compute	M.Sc.Eng. Mathematical Modeling and Computing
13	DTU, Department of Chemical and Biochemical Engineering	Chemical and Biochemical Engineering
14	DTU	Electrical engineering
15	KU, SCIENCE	Agricultural Economics, MSc
16	KU, SCIENCE	Molecular Biomedicine
17	KU, SCIENCE	Molekulær biomedicin
18	KU, SCIENCE	Molekulær Biomedicin
19	KU, SCIENCE	MSc in Biology
20	KU, SCIENCE	Biology
21	KU, SCIENCE	Biology, Genomics
22	KU, SCIENCE	Biotech
23	KU, SCIENCE	Master in Agriculture
24	KU, SCIENCE	Nano science
25	KU, SCIENCE	Nanoscience
26	KU, SCIENCE	Landskabsarkitektur
27	KU, SCIENCE	Landscape architecture
28	KU, SCIENCE	Human physiology: Institute of nutrition, exercise and sport
29	KU, SCIENCE	Geography
30	KU, SAMF	Political Science
31	KU, SAMF	Anthropology
32	KU, SAMF	Psykologi
33	KU, HUM	IT & Cognition
34	KU, HUM	Rhetoric
35	KU, HUM	Scandinavian Studies and Linguistics, minor in Philosophy
36	KU, HUM	Master of Arts Education
37	KU, HUM	Applied Cultural Analysis
38	RUC, SAMF	sociology and philosophy
39	RUC	Social entrepreneurship
40	ITU	Digital Design and Communication
41	Århus Universitet	Business Development Engineering
42	University of Roma, TRE	M.SC. in development and environment economics

Appendix 4 *Staff*

Name, title and contact	University	Main area and/or role	Covering the learning goals
Annette Bruun Jensen Associate professor abj@life.ku.dk +45 353-32662	University of Copenhagen Department of Plant and Environmental Sciences	Biomimicry lecturer Course coordinator, KU Counseling sessions in week 3	- Understand biology as a source for innovation - Describe and categorize biological solutions according to a specific assignment/topic - Transfer biological knowledge into innovative solutions
Jacobus Boomsma Professor +45 35 32 13 40 jjboomsma@bio.ku.dk	University of Copenhagen Department of Biology, Ecology and Evolution Centre of Social Evolution	Biomimicry Lecturer	- Understand biology as a source for innovation - Describe and categorize biological solutions according to a specific assignment/topic - Transfer biological knowledge into innovative solutions
Torben Lenau Associate professor lenau@mek.dtu.dk	Technical University of Denmark Department of Management Engineering. Innovation and Sustainability.	Biomimicry lecturer, Biomimicry expert, material science Counseling sessions in week 3	- Understand biology as a source for innovation - Describe and categorize biological solutions according to a specific assignment/topic - Transfer biological knowledge into innovative solutions
Philip Cash Assistant professor pcas@dtu.dk	Technical University of Denmark Technology and Innovation Department of Management Engineering	Biomimicry lecturer, Course coordinator, DTU	- Understand biology as a source for innovation - Describe and categorize biological solutions according to a specific assignment/topic - Transfer biological knowledge into innovative solutions
Daved Barry Professor db.lpf@cbs.dk	Copenhagen Business School Department of Management, Politics and Philosophy	Innovation lecturer,	- Obtain an overview of concept and theory of innovation management, innovation process models, exploitation and creation - Explain innovation models and use novel tools for innovative creation
Balder Onarheim Assistant professor balder@onarheim.com	Technical University of Denmark Management Engineering Technology and Innovation Management	Concept design, process design lecturer	- Obtain an overview of concept and theory of innovation managements, innovation process models, exploitation and creation - Ability to discuss, evaluate and decide among creative solutions - Communicate ideas clearly, concisely and confidently in writing and orally to stakeholders
Maja Horst PhD, Head of Department horst@hum.ku.dk	University of Copenhagen Faculty of Humanities Department of Media, Cognition and communication	Interdisciplinarity lecturer	- Understand how to manage a collaboration process in a multidisciplinary setting - Distribute tasks and responsibilities in a multidisciplinary environment

			- Ability to make use of own and other persons' competences in multidisciplinary work
Thure Pavlo Hauser, lektor,	Institut for Plante- og Miljøvidenskab, Zoologi og Botanik, Københavns Uni.	Counseling sessions in week 3	---
Morten de Fine Friis-Olivarius PhD Fellow	CBS Department of Marketing	Inspirational lecturer week 1	---
Maria Mackinney-Valentin Associate Professor	Royal Danish Academy of Fine Arts, Design School	Inspirational lecturer in week 2	---
Julian Vincent Honorary Professor of Biomimetics	University of Bath	Inspirational lecturer in week 3 Counseling sessions in week 3	---

Facilitation

Nina Riis Course and programme consultant Nina.riis@science.ku.dk	KU, Katapult http://katapult.ku.dk/english	Facilitator Project manager of the summer school
Rikke Okholm Innovation consultant rikke.kortsen.okholm@science.ku.dk	KU, Katapult http://katapult.ku.dk/english	Facilitator Project manager of the summer school
Marjanne Kurth Project manager mkurth@hum.ku.dk	KU, Katalyst	Facilitator
Joakim Rex 40 79 50 00 joakimrex@gmail.com	External consultant	Facilitator
TI Fablab, CIID Anette Høgh Sonnichsen	External consultant	Prototyping workshop
Majse Garde Bergman	External consultant	Presentation technique workshop

Practical matters, communication, documentation, evaluation

Sille Julie Jøhnk Abildgaard Project manager sillejulie@gmail.com	KU, Katapult	Coordination and communication
Pernille Lindberg Bruhn Student Assistent pernille.l.bruhn@science.ku.dk.	KU, Katapult	Coordination and communication

Julie Ugleholdt Student Assistent julie.ugleholdt@gmail.com	KU, Katapult	Internal evaluation of the summer school
Amalie Jeppesen amalie@alphafilm.dk 40592136	Alpha Film http://alphafilm.dk	Photography and video recording for scientific documentary about biomimicry
Peter Andreas Mellbye petanmel@gmail.com	KU, Katapult	Photographer in week 1

Introduction

The case description is a summary of the innovation challenge, which the team must solve for the company during the summer school *Innovation Inspired by Nature* in August 2013.

The case description as a management tool

The case description forms the basis of the team's project and works as a continuous management tool while solving the challenge during the summer school. The case description also serves as the foundation for the company's assessment of the team's final solution.

Procedure for changes in the innovation challenge

The team may discover that the challenge presented by the company needs to be rephrased. This might occur when the team gains deeper insight and discover new opportunities. If the team considers changing the innovation challenge both the company representative and the summer school facilitator and coordinator should always approve it.

The case description entails

1. A brief presentation of the company
2. The innovation challenge
   - The background of the challenge
   - The specific innovation challenge
   - The company's expectations and requirements for the solution to the challenge
3. Contact information

1. Briefly about ▮▮▮▮

Working with ▮▮▮▮ tapping into the main pipeline of the Experience Economy ▮▮▮▮▮▮ founded ▮▮▮▮ in 2008. Today, the partner group consists of 5 senior partners and celebrates a very diverse set of competencies ranging from hardcore business developers to workshop facilitators and communications managers – and even a lawyer. ▮▮▮▮ are Certified Experience Economy Experts from Pine & Gillmore –key strategic partners of ▮▮▮▮ ▮▮▮▮ is a strong network organization with associates all over the world, which enables them to hire the best people for the support of the projects they engage in.

2. The innovation challenge

▮▮▮▮ presents the team the following case challenge.

The background of the challenge

Working with Experience Economy in a very diverse knowledge environment ▮▮▮▮ needs an engaging and innovative setting for meetings at ▮▮▮▮▮▮

The specific innovation challenge

- Create a meeting area at ▮▮▮▮▮▮

Based on the background of the challenge described above the team's innovation challenge is to develop a concept for a new innovative outdoor meeting area at ▮▮▮▮

Expectations and requirements

▮▮▮▮ expects the team to develop and present a comprehensive concept inspired by nature that fits the values, organization and core competencies of ▮▮▮▮ while at the same time pushes the boundaries for what would normally constitute a meeting area. The concept for the new meeting area should be physical and placed somewhere at the grounds of the ▮▮▮▮▮▮▮▮▮▮▮▮▮▮

▮▮▮▮

▮▮▮▮ evaluates the solution by the following criteria:
- Nature
- Novelty
- Inspiration and creativity
- Social interaction
- Knowledge

3. Contact information

Contact information of people that are available for the summer school team.

███████████ representative
███████████
████████████████████████████
████████████████
█████████████

Facilitator
Joakim Rex
phone no: 40 79 50 00
Mail: joakimrex@gmail.com

Summer school coordinator
Name: Sille Abildgaard
Københavns Universitet, Katapult
Bülowsvej 17, Frederiksberg Campus
Phone no: 22 15 18 58
Mail: sillejulie@gmail.com

Introduction

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The team may discover that the challenge presented by the company needs to be rephrased. This might occur when the team gains deeper insight and discover new opportunities. If the team considers changing the innovation challenge both the company representative and the summer school facilitator and coordinator should always approve it.

The case description entails

1. A brief presentation of the company
2. The innovation challenge
   - The background of the challenge
   - The specific innovation challenge
   - The company's expectations and requirements for the solution to the challenge
3. Contact information

1. Briefly about the company

██████████ targets the development of combined solutions for industrial and agricultural tasks

- Turn-over approx. 1,2 mill DKr
- There are 4 main divisions within██████████████████ Soil division (48%), Grass/Feeders (27%), Grain & Straw (12 %) and Industry (11%) (besides Vitfoss). With main production sites 6 places around the world
- Worldwide approx. 1.500 -1.600 employees located in more than 10 countries.

The company is divided into these business areas:

Soil, Grass & Feeders: Soil preparation from stubble to harvest and optimized machine chain from field to muzzle███████████develops methods and equipment for soil cultivation and plant care marketed under the brands;██████████████████████████████For the production and feeding of green fodder██████████markets grassland machinery and complete diet mixers under the ████████ll.

Grain & Straw: System solutions for the agriculture██████████is known for its particular competence in the transportation, drying, storage and sorting of grain and other crops as well as systems for drying big bales. In addition,██████████offers a comprehensive range of mobile heaters for drying and heating in the agricultural, construction and industrial sectors.

Industry: System solutions for the industry. For the plastic, paper and packaging industries██████████has specialized in concepts for pneumatical transport and handling of process material.

2. The innovation challenge

The background of the challenge

Every year██████████████████ produces over 700.000 pieces of wear parts and additionally over 500.000 spare parts for soil tillage machines. This product range is an economically important market for ██████████████████████The market for spare parts is a very competitive market with focus on the price/lifetime ratio. Therefore, it is a great competitive importance if wear parts with a more favourable price/lifetime ratio can be developed. Moreover, today 40-60 percentage of a wear part is not worn away when the parts has to be changed due to functional considerations. This causes a major resource waste and consumes time for the farmer when replacing the parts. If possible, developing wear parts leaving a smaller share of the wear part at replacing and simultaneously prolonging the life time would bring██████████in the lead position in the market and make the production of wear parts more sustainable.

Some soil-burrowing animals and other biological organisms living in contact with abrasive materials has surfaces optimized for reducing drag and wear. Information of such bio-inspired surface structures has been used and investigated by Tong et al. (2012), who showed increased lifetime of wear parts for soil tillage tools by introducing "knots" on the wear part surface. The increased lifetime was explained by a reduced abrasive wear due to change of the soil flow over the wear part from "sliding/laminar" to "rolling/turbulent" soil flow. The design of the knots was inspired from knots on the forehead on soil-dwelling beetles. Tong et al. (2007) and Tong et al. (2011) describe other surface designs inspired by structures observed in the nature, such as mussel shells and anteater scales.

The specific Innovation challenge

The main challenge is to develop brilliant ideas and inspiration for wear parts for soil tillage implements at ███████████

It would be appropriate to look for methods of doing tillage and new wear part engineering by transforming biomimetic into relevant concepts that can be embedded into new designs and improving the lifetime of wear parts. These concepts will then be used for ████████ ongoing work on the development of new spare parts with improved price/lifetime ratio.

Expectations and requirements

████████ requests knowledge of surface structures and/or materials that could be introduced for wear parts in relation to soil tillage tools. This new knowledge could be obtained from studies seen in nature, either on nano, micro or macro level, mechanical or chemical, methods and/or physical.

████████ wants to maintain sales and production flow by expanding improving the product range of wear parts and tillage tools. This means that ████████ *not* looking for solutions that may expand the durability in relation to lifetime only. ████████ searching for solutions that improve the material exploitation, increasing lifetime/price ratio by upgraded engineering methods and reducing costs.

3

3. Contact information

Contact information of people that are available for the summer school team.

Company representative
Name: ███████████

Facilitator
Name: Rikke Okholm
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Summer school coordinator
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Bülowsvej 17, Frederiksberg Campus
Phone no: 22 15 18 58
Mail: sillejulie@gmail.com

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Appendix 7 *Observation Guide - Creativity*

FOCUS POINTS	
A) EXERCISE / ACTIVITIES	What is the name of the exercise? What kind of exercise is it (brainstorm, evaluation, proto-type etc.)? What does the exercise do? How are they working with the exercise?
B) QUALITY OF OUTPUT	What kind of output is the exercise generating (ideas, prob-lem, criteria etc.)? Which themes are they operating within? How detailed is the output (abstract or practical)?
C) QUANTATY OF OUTPUT	How many ideas, problems, prototypes etc. is the exercise generating?

Appendix 8 *Observation Guide – Innovation*

FOCUS POINTS	
A) SEARCH	Are they exploring or searching for problems or ideas to work further with in the process?
B) SELECT	Are they selecting either problems or ideas to continue with in the process?
C) TEST & VALIDATE	Are they evaluating, testing or validating ideas or problems in the group or by externals?
D) DEVELOP	Are they developing ideas by sketching or physical proto-types? What are they using for prototyping?

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Monday 12th August 2013

1 It is 8 o'clock and we are in a large Villa with basement,
2 ground floor and first floor. The lectures are being hold in
3 what possible has been the living room in the house. There are
4 approximately 40 chairs in the 'living' room, which has wooden
5 floors, a decorative sealing, dark wooden shelves/book cases
6 and three windows. At the ground floor there is also a kitch-
7 en, terrace, toilet, hallway and two rooms, where four groups
8 are working. Both rooms have furniture and there are set up
9 four workstations (one for each group, where they can work).
10 There is furniture such as couches, which makes the room more
11 'house' like than ordinary lecture rooms.
12 I enter the studio at 8.00 where two of the coordinators are
13 getting everything ready for the day. The students will come
14 at 8.30 so they a making breakfast, coffee etc. ready before
15 they arrive. Everybody is on time and we start in the lecture
16 room at 9.00. Nina is presenting practicalities and what they
17 are to expect for today. She is also describing the delivera-
18 ble for this week so they know what to work towards this week.
19 She explains that today the students are to create a context
20 map and a workshop. Nina explains that a lot of externals are
21 to come during the week and that we will end the week with
22 beer and pizza. There will also be a party, the Olympics,
23 where the students have to compete with another summer school.
24 Other practical stuff is explained. Before the lecture starts
25 there is a representative from Ciel that will do some evalua-
26 tion on the entrepreneurial minds. Next some groups are re-
27 formed and moved around, as some students have not shown up.
28 This creates some irritations as the facilitators spent time
29 on Friday on team building.
30 Lecture 1 starts, the creative day by Balder Onarheim begins.
31 He wraps up Friday and asks about the gifts that people are to
32 bring. He has brought a book for inspiration. Then he explains
33 what the day is about regarding the teams, theory and cases.
34 This week they can expect to be loaded with theory and problem
35 finding. Next week they will have to combine problem with the-
36 ory, and at week 3 they will work with the problem. Purpose
37 for today is to know how to work on from now. He presents the
38 fundamental work from his field, creativity. Spends a lot of

39 time talking about the importance of problems and the work
40 with them. Clear problem vs. unclear problem requires differ-
41 ent ways of thinking. Unclear problems create uncertain solu-
42 tions and it will drive them out of comfort zone. He explains
43 about ill and well defines problems and extends with the con-
44 cept of design and how to link it to creativity. There is con-
45 tinuous emphasis on problems and the quality of problems,
46 which will make better solutions. More time spent on problem
47 will make better solutions. There is then a break on 10 min.
48 The next lecture starts, Creativity and design process. Here
49 the double diamond is explained + the phases that they will be
50 going through. He also explains what creativity is by the use
51 of different definitions ex. De Bruni: Not fun and crazy, but
52 key to success in all areas. It has to be useful in teams +
53 individual. Brainstorms are misunderstood. Use the tools. Do
54 it right. Ignorance and innocence is key to creativity. Less
55 information is good. He relates it to the cases. They do not
56 have info = that is good. He talks about lateral thinking and
57 backtrack of ideas. Obvious. He describe show creativity has
58 unnatural pattern and not evolutionary gain. He describes dif-
59 ference in definitions of novel and useful for the individual
60 and the historical context. How divergence and convergence is
61 a part of the dual process. Divergent = new alternatives. Con-
62 vergence = selecting based on criteria. He also describes con-
63 straints. He moves on with describing the prescriptive
64 (should) vs. descriptive (how it was) part of the creative
65 process. Design is a planned creative process. He shows exam-
66 ples from Wallas with the phases: Preparation, incubation, in-
67 timation, illumination, insight and verification. He shows
68 Cooper's example with is a process for innovation that has no
69 evaluation and expects and idea upfront and has no creativity
70 in the process. It is to build a business case without being
71 creative and divergent. Cooper is prescriptive. In many design
72 processes there is iterations, and you can go back. He ex-
73 plains the double diamond with the phases discover, define,
74 develop and deliver. Discover: research and information man-
75 agement. Define: development. Develop: Multiple things, work
76 and testing. Deliver: testing the idea. Balder then describe
77 how the double diamond will work on the three weeks that they
78 will be going through.
79 The first exercise starts. They will have to outline and map
80 the key concepts that they expect to work with the coming
81 weeks.

Team D: creates 30 concepts and bundles them in 4 to 5 catego-
ries. Team C are linking, back and forth. Difficult to 'nail'
the right concepts. This is due to different backgrounds, not
yet shared language. Team A + B focus on the three weeks; ex-
plore, develop and implement and creates a continent of the
concepts. Everybody meets in the room and the students give
feedback of the exercise. It is difficult for them with the
different backgrounds. The next lecture starts on creativity
constraints with Balder Onarheim. He describe show constraints
is personal and different with in the teams. Constraints pro-
vide usefulness. Constraints are dynamic and have different
roles. Everybody has a sweet spot and it can create tension.
They can be formalized, tacit and you can work with them in-
tentionally. It is time for lunch. In the lunch break there is
a lot of tension in the lecturer room as there is a lot of
problems with CBS, as they have the space. After lunch they
have their have their next lecturer with Balder and they are
to do a team workshop: Opening the case. The workshop is for
45 min. They have to evaluate what they know. 1. Assumption
dumption at an individual level and next they share with the
team and organize it categorize; relevant, irrelevant and
things they need to investigate. 2. Constraining mapping with
same structure; individual and team organizing. They are told
to remember to use posits. And they of course have to relate
it to their case to let go of their constraints of what they
think about the case. They are also told to do an idea parking
lot where they can put their initial ideas. They get the exer-
cise in handouts. Team C "let us not be constrained by the
farmer that is conservative". They do not understand and has
the facilitator explain. They are discussing resources. TEAM D
is doing the exercise individually and some are hesitant. They
stopped pretty fast. Did not know what to do. Team A + B are
in the meantime relocated, as some did not show last week. The
facilitator tries to mix them in the different backgrounds.
After 5 min Team C is still doing the individual exercise and
after the exercise Team A + B are split up. Which means that
they did not do their exercise. Team D did 5 min individual
and then shared. At the assumption dumption they had 16 as-
sumptions and at the constraining mapping they got 6 con-
straints. They have discussed how the company is not improving
and they are not innovative. They are discussion in different
languages "isn't there a word for improving innovation vs. de-
veloping an innovation" and they want to investigate this.
They agree that it is irrelevant that customers are difficult

or stupid. They also want to investigate how the product is
not practical, as it takes 5 hours to change the harrow
points. They agree that it is irrelevant if it shall be easier
to change. And they want to investigate how it works in dif-
ferent types of soil conditions, as they are not sure about
this. Also they will investigate how come it has to be changes
2-4 times a season. TEAM B get 21 relevant, 40 things to in-
vestigate and 3 things that are irrelevant. They did 10 min
individually and then shared in the groups. They talked about
how their problem could be long lasting, cheep, chair +
stools, regular temperature, product fit with brand value,
wild and show off, cool, beautiful, light end of bio (con-
straint), environment. They discuss problems about what is
relevant to company Y and what is relevant to them? TEAM A
discusses how cold, how hot, how strong the wind blows, part-
ners and target groups. After the exercise next lecture
starts: Lecture — Creativity in practice by Balder Onarheim.
Balder talks about how to seek inspiration, shift between in-
dividual and team when doing the exercise, use post-its. What
is worth thinking is worth saying — open your mouth, focus on
constraints. Use the tools consciously, kill your darlings. He
mentions the idea parking lot again (no one really used it be-
fore) and that they have to utilize different disciplines. He
gives some examples of which tools to use: Brainstorm, random,
what would xx do?, Bad ideas, sleep (mind wandering), forced
idea paring. After a short break next lecture on multi-
disciplinarity starts. Balder describes, shared platform of
understanding & vision, climate, resilience, idea owner, net-
work activates, learning from experience, common commitment,
discovered purpose, specific performance goals, lack of skills
can be positive, clear rules of behaviour. They are to do a
workshop where they will revise the team charter that they did
on the kick off day to establish the team properly in 7 steps.
Then there is a birthday song. Team C discuss their vision and
they want to be game changing and create a paradigm shift.
They also want to use nature so they do the catch line 'nature
is nice'. TEAM A has some conflicts between Company Y and this
course and the expectations for the exam. They decide that
they have to consider themselves first and then Company Y.
They will work with an idea that Company Y would not have
thought of (ideal). Something far away from roof top garden.
Not be afraid to think outside the box, "we dare to dare".
They will push Company Y's expectations. More interested in
good grade/project than doing what Company Y says. They are

170 willing to work on ill-define problem and they show a lot of
171 task motivation and ownership of the problem. TEAM D discuss
172 that they want to be proud of what they do. Create good team-
173 work, share norms and use it for later. They want a creative
174 solution that the companies want to realise. Co-creation with
175 Company X. They call it co-creativity. Meanwhile Team C are
176 more products oriented and are discussing criteria. They are
177 all ready using their idea parking lot. TEAM D: wants to chal-
178 lenge what company know. Company is expert and they want to
179 learn from them and give them something that can inspire them
180 (problem map). Team C, when looking at expectations they
181 started going back to workshop2. TEAM B, they are pretty down
182 after split up. Moved into the other room and did not work
183 much. Facilitator finds it hard to make them alive again. TEAM
184 A, "what are we aiming at? Abstract way of thinking and more
185 general. They do not want to create something for Company Y.
186 It is not a problem just to make an outdoor space, but the
187 fact of having an outdoor space indoor while also being com-
188 fortable outside. TEAM D, they want to do a dinner together.
189 More social things. They find they calendars to figure out
190 when to work together after school. TEAM A, key purpose; learn
191 creativity, processes, multi-disciplinarity, team work, fin-
192 ished solution, something that you can explain — sketch or
193 prototype. TEAM B, which was pretty depressed after the switch
194 has a very dark workplace. They take ownership of the room and
195 move the things around. They talk about if one should bring a
196 lava lamp to make it nice. Team C shares their contact and
197 have breaks every hour. Team A and team B take a break outside
198 together. I ask one student from team C what innovation and
199 creativity is for him: Creativity: does not have to be new,
200 that is innovation. Innovation: Combine something (creativity)
201 and create something new. I ask one student from team A the
202 same, Innovation: commercial. Creativity: Problem solving
203 tool, not causal connection.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Tuesday 13th August 2013

204 I enter the villa at 8.15. Marjanne tells that one of the
205 groups have made a rule that they need to do jumping jacks,
206 they are having great fun. The day starts with the lecture by
207 Torben Lenau. They have to learn how to search for inspiration
208 in nature. They have to work with a design problem — the alarm
209 clock. They have to brainstorm and find things in nature that

can work as an alarm clock. First 5 min individual and then in the group. The students are a little annoyed that they could not work with their case on this. Torben walks around while they are working. Team A, "I don't know much about animals". They talk about smell, afraid that animals just hide, stinky flowers, mushrooms. Team D have changed names to Innovation Monkeys. TEAM D, talk about smell, light, volcanoes, earth-quake, vibrations and birds. Team A, attention, birds when mating, signals from peacocks, show off, octopus that uses ink when for protection. Came, spits if you get too close. Flow-ers, pretty and attracts attention. Skunks, smells bad. Coral, pull back mechanism + it stingers on it. Monkey that screams, dog barks, cat hair, lion tale, gazelle run, mimosa closes down, wandering stick. Talks a lot about visual attention + warning mechanism. Danger, shiny, too close up. Open quickly, technical, mussel's protection. All the teams meet in the room and one by one they explain what they have found. 1) Sounds, smell, bees smell with phonons. 2) Fireflies, vibration, bean of light. 3) Peacock, visual attention. 4) Movements, noise, colours, ants smell phonons. 5) Spider, communicates with pho-nons, bat. 6) Peacock, bees, elephants, and rabbit: sense vi-brations through feet. 7) Mushroom, colour, ants — phonons ac-tivates group of ants. 8) Birds, noise, sense, echo, rabbit. After the feed back they are to do the next exercise and this time they have to work on the former problem but also direct the crowed. TEAM D, talks about how they can use the shake of an earthquake and the beam of light to direct people. After the exercise the teams meet up and presents what they have found. 1) Ants: highway with trace of phonons. Enforce trace/path more ants. 2) Bees: hive- dancing and directing crowed. 3) Volcano + fireflies: activation shake. 4) Light of a jellyfish. 5) Starling flocks of fish that communicates with side organ and follows the leader. Also birds flying together. 6) Birds sight: magnetic fields — direction. 7) Dessent: cir-cle around you when you're down. Torben comments on this and says that fish school with high density have been used in car driving and by having the right distance. They are to do the third exercise and use asknature.org + make some bio cards. Their homework is to make the bio cards. There is a good vibe and the students welcome the theme. After a short break it is time for the first innovation lecture with Daved Barry. "No framework — what do you know? He talks about 3rd person crea-tivity, them and it. He asks around for an update from the students. "How are you with the problem? Did you figure it

254 out?". A few students answer and it seems that they in general
255 are taking two approaches 1) Technical or 2) awareness. Some
256 are also describing how they feel about the course. It is
257 cool. One student from Team D says that they are doing the
258 problem analysis, working with constraints, asking questions;
259 how deep can it go in the soil? What are the limits? They are
260 exploring and looking for boarders. One says that they are up
261 for the task and it is interesting. Another person in the
262 group says, "You can see stuff that they (the company) could
263 not see". Daved picks up on that and talks about another
264 course that he had with Novo Nordisk as a case and explains
265 that the students saw many issues, but they did not want to
266 recognize the problem. Today the students will do the follow-
267 ing exercise: 4 field model of creativity and innovation,
268 first person innovation & creativity (FPIC), forming FPIC team
269 codex and trying out the codex. Daved pushes the students by
270 asking very direct questions. He also tells funny anecdotes.
271 He asks how they understand creativity? One says that it is a
272 kind of inspiration, you build a structure to use later on, it
273 is improvisation, you don't really think about it, but you can
274 physicalize it. It is the use of other senses and it happens
275 in accidents. Another person links the question to Balder's
276 teaching and says that you have to post-pone solutions. Daved
277 says that it has to do with making analogies. Cigarettes are
278 like natural filters. Soil. Concrete. Hair. He starts to talk
279 about the Phillip Stark lemon juicer and everybody laughs. He
280 is really good at engaging students in the room and in the
281 conversation. It is time for the first exercise, First Person
282 Innovation & Creativity (FPIC) where they are to describe what
283 creativity is for them personally and then finish of by writ-
284 ing everything on the wall in the room next to the lecture
285 room. They go to the groups and team A + team D starts doing
286 the exercise. They are very quiet and it is obvious that a lot
287 of the students do not get it. They are not discussing and it
288 takes an awhile before they start. Some starts to write on the
289 big wall and different techniques like shopping, biking, tak-
290 ing the train alone, not thinking on the case (incubation),
291 internet browsing, mind mapping, using something unknown,
292 speed writing, sleeping, topical thinking etc. were written on
293 the wall as something that made them creative. The students
294 got inspired by one another when seeing how and what the oth-
295 ers wrote on the wall. After the exercises everyone enters the
296 room to sum up the collective pool of creativity. One put a
297 post-it that say, "have kids" as they have no boundaries and

says the weirdest things. Daved picks/points on post-its and then the one who wrote it shall elaborate. One wrote "topical thinking" and it is for mapping of different places. One asks how to involve it with the casework. And how you can learn more. E.g. cigarettes – unpack, levels, change there understanding. There is also written meditation, lying down (unstructured), music and moods and focus. They talk about how there are different levels of doing all these things. One student express how he is using on an active level and it creates a trance mood. It becomes a soundtrack to his work. The most common elements of the things that they found was techniques working with cognitive inhibition, priming, slow thinking, fast thinking. One student did a drawing instead of writing, but he changes it because it was too different. They are also taking about stimuli drinking coffee, using pinterest, and watching TED talks, when being inspired by people explaining. One wrote that he saw anti patterns. He looks at patterns and tries to imagine other patterns. One wrote future trends, how would we do it in the future. Getting lost or go bike ride without knowing where you were going made another student more open-minded. More aware of the surroundings. Not a lot of the students learned these techniques in school. No Daved asks the students to think about what techniques to use and they will need to do the FPIC team codex. Team A talks about how they will use photography, alternative ways of thinking/understanding/looking at world/society, art. They talk about Lego and how it can have different levels beginner: Lego, intermediate: Lego structure. They also want to work with their state of mind, mind map for structuring ideas and explaining new connections. They will like to use sketching, as it will force the person to elaborate. This is both for divergent and convergent phase. Sketching is both for product, service and motion. Team B, will like to visualize, draw, express oneself. Say words when present. Draw and use symbols. Talk about convergent and divergent techniques. Emphasis drawing and prototyping. They talk about the carbon work Joakim brought. They are inspired by the folding fence he made. They also want to use the meeting rules from Joakim, they call it the boring rules. They talk about anti patterns when seeing things. They want to bring stuff for inspiration to incorporate stimulus. TEAM A, they talk about if techniques are only for divergence? TEAM D, while doing the codex ideas evolve and they park it at the idea parking lot. They are now trying out what they put in the template. The association word game as

342 Daved asked them how they would use it. They start the game
343 and selects best ideas with stars. They can put 5 stars each
344 for voting. They remove all the other ideas expect from them
345 for the stars. Some wants to diverge and some wants to con-
346 verge, "it will be too chaotic" and they remove some of the
347 other ideas based on nothing. They want more constraints and
348 they structure how they will redo it. New brainstorm based on
349 a constraint, which is the case. They go back to the classroom
350 for sum up. It seems like a lot of the students had creativity
351 classes or worked with creativity before. Daved are describing
352 different kinds of brainstorming tools and says that they will
353 define what they do. He says that this is just the beginning
354 and the template will varied depending on group and people. He
355 tells about changing the environment, changing the position of
356 things. Bringing new stuff into the room. Change perspectives.
357 Team D, have put the following to their codex: Change environ-
358 ment, personalize space, playful, music and association game.
359 Team C, Clay-play, Lego and creating stuff.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Wednesday 14th August 2013

360 Today I enter at 8.30 and make myself coffee before the lec-
361 ture starts. The lecture starts at 9.00 with biomimicry lec-
362 ture 2 — understanding biomimicry by Annette Bruun Jensen. It
363 is about how to transfer bio knowledge. She encourages helping
364 one another across disciplines. She says that she was inspired
365 by Torben. She explains about evolutionary theories. What she
366 is using bio for. She has lots of pictures. She gives the stu-
367 dents knowledge on how to make sense of nature much more pro-
368 found knowledge. She talks about co-evolution and parasitism,
369 through killing ants. She links it to Torben's lecture and the
370 relevance on how to use it bio-inspired design. She also says
371 that evolution has no goal. She presents the first exercise:
372 Explain bio phenomenon and how to search. Team C, are already
373 doing the case and less focused on the exercise. Everyone
374 meets up in the classroom after doing the exercise. In general
375 the students find it easy to search, but hard to keep focus,
376 as there is lots of inspiration. It is challenging the find
377 the key aspect. It is also challenging to translate bio prin-
378 ciples to function. Most of them have used askenature.org,
379 Google and videos. They like to find more principles and one
380 student says that it made him curious. They are all sharing
381 how they searched. One says that one animal was especially in-

382 spiring as it had more functions.one students used it in an-
383 other way of looking for a function. He found an animal, got
384 inspired by it and worked from there. What can I use it for.
385 In plenum it is then addressed that there is two ways of using
386 nature. 1) From a design point of view where you get inspired
387 by an animal and 2) where you have a task and then go to
388 search nature. Torben gives advice on how to search in many
389 directions and work with it in the field. There is a short
390 break before the next lecture starts. They are to work with
391 the 4-box system as an evaluation tool. The students go into
392 the groups and start to use the new method. Team A, think that
393 it is good to compare things, helps to translate, more de-
394 tailed, model for using bio-cards, more specific but in a way
395 that I simple. She says that they need both and bio cards are
396 more visual. They like bio-cards more than the 4 box. TEAM D,
397 They are working with eel and the box. It lives in the sea,
398 works in complete darkness, slick movement, generate eclectic
399 fields. Team B, works with the spider. In general the groups
400 has difficulties working with the model and some gave up and
401 did something else. There is a short break and the next inspi-
402 rational lecture on social insect by Jacobus Boomsma starts.
403 Social insects are ants, termites, bees, wasp etc. he explains
404 how insects has many resemblances of human society. Like ar-
405 chitecture when it comes to temperature, buildings, farmers,
406 waste management. They have no leadership, communication
407 structure or barcode from phonons. They also have sperm banks.
408 There is a meeting with facilitators at 12.00 in the staff
409 room. All facilitators go through the teams. The facilitator
410 of team A + B explains that they have been re-grouped based on
411 the skills. He is pushing them to work more on vision. They
412 agree that the facilitators shall focus more on what the stu-
413 dents has to hand in. there is confusion amongst the facilita-
414 tors if they have to work more on the case or team dynamics.
415 The next lecture starts it is the creative brain by Morten. He
416 starts out with defining what creativity is. It is novel and
417 useful. On a personal level it is creating new patterns, in-
418 spire others, finding a new way, something new etc. he intro-
419 duce 4p model of creativity. He talks about combination, back-
420 tracking ideas — how did I come up with the idea. He talks
421 about Charlie Parker and human uniqueness, "we all have it,
422 some more structured than others. Different in how you express
423 it". It is intuitively (the creative process). Animals have it
424 as well, it is basics in the brain. It is using knowledge in a
425 new fashion, we see things in a context. He goes on telling

426 about cognitive inhibition and fixation, which is a memory
427 blocking. There is a break and I talk with the lecturer about
428 the 4 box, should facilitators have been there as they could
429 not figure out how to use it?. When the break is over he talks
430 about assumption and incubation. Creativity might be correlat-
431 ed to IQ, but at some point related to the amount of associa-
432 tions you have. He gives an advice that not to look at others
433 and what they do, make your own ideas first, when you are fix-
434 ated go for a walk, wait to look at others ideas and do not be
435 negative. After the lecture they have from 15.00-17.00 to work
436 in teams. The facilitators are there to help the teams with
437 the work. Joakim collects team A + B and they are to work to-
438 gether for reaching the deliverable of the week: Problem un-
439 derstanding, context map and workshop design. He says to them
440 that they shall not just work with Company respondent Y's def-
441 inition of the problem. It has to be more than a meeting
442 space, engaging + interesting. They talk about what the out-
443 come + timeframe shall be for the workshop. One is not sure if
444 it just a creative interview. Both Team C and A makes a prob-
445 lem — research wall + an idea wall. They write up the problem.
446 They also write problem criteria for solution to make it visu-
447 al. The facilitators for both Company X groups are a little
448 tired, as one of the groups cannot work together. Team D, are
449 working with the problem and they are not doing brainstorm,
450 they are just basing it on talk during the week. Team A + B
451 has divided up the tasks and 3 people are working on the prob-
452 lem. They are talking about an outdoor space with more possi-
453 bility for interacting. This I kind of a frame for the chal-
454 lenge. Joakim pushes them and says that they can solve more
455 problems than one. He says that they have to challenge Company
456 respondent Y a lot. They start to work on a brainstorm on the
457 problem, but it is very difficult for them to work on the
458 problem. They are struggling with solution vs. problem and it
459 is difficult for them to get started. One student is talking
460 about the problem to be more on a general level and how flexi-
461 ble they space should be for the clients. They also discuss
462 how it can add value. The are discussing a lot how it can add
463 value and it seems like this is too short time to dive into
464 the problem. Mean while the once working with context mapping
465 are going back to assumption dumption. The ones working on the
466 problem are also talking about criteria's. It should be social
467 and comfortable. The facilitator pushes them and asks if there
468 are other problems and if others can come with input. One stu-
469 dent does not think it is possible to answer what they have

470 come up with. They end the day it seems like they did not go
471 that far with the problem.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Thursday 15th August 2013

472 The day starts with a lecture with Daved Berry at 9.00. Daved
473 starts by asking what you should do to be creative? One an-
474 swers by no constraint and mind wondering to move inhibitions
475 and also by acknowledging that everyone can be creative. One
476 says that you should inspire each other. Daved adds that they
477 should not say no. one also says that that one should relax
478 and step down with music. The last comment is about to create
479 something new by using old terms. Daved present todays work
480 and they are to rethink the articles that they had been read-
481 ing. They have to answer what is missing and what they would
482 change in the articles. They go to the groups and starts work-
483 ing on the exercise. Team A + B are working with manager theo-
484 ries about the process of innovation. Team B talks about the
485 paradox that they are constrained but they are not doing any-
486 thing about it.it is going very slow. In the sum up session
487 Daved are making the students move closer together to create a
488 better atmosphere. One of the other groups are talking about
489 Blue Icon. Daved askes how they can apply this exercise to the
490 case? One student answers that it might be an aesthetic prob-
491 lem. One says that they can use it to think about language and
492 find people that can translate when they talk to the company
493 on Monday. They need to talk and observe to know what the lan-
494 guage is. Daved adds that they can come up with a 'midwifes'
495 for the workshop on Monday and question the key respondents.
496 He gives an example about clay street and how they person that
497 started that project always asked 5 questions when he had to
498 talk to a new company. 1) I love you for xxx 2) Tell me more
499 about how things work 3) can you give me an example of an suc-
500 cessful innovation and why 4) can you give me an example of a
501 failed innovation 5) if you could change one thing for innova-
502 tion what would it be. There is a short break and the next
503 lecture starts. It is about cross disciplinarity be Maja
504 Horst. I do not attend the lecture, as I have to prepare for
505 my evaluation of the students first week the day after. I send
506 the hour in the staff room make the schemas ready. I talk to
507 the lecturers about the evaluation. After the lecture they
508 have a short break and I talk to some of the students how the
509 lecture was like. It seems like they did not like it and that

510 it just provided information that was al ready given. The next
511 lecture is by Philip Cash, which is about how to apply nature.
512 He explains that there is two ways of doing it 1) problem-
513 driven and 2) solution-driven. You either have a well define
514 problem and then go and look at nature for a solution. E.g. hi
515 gives an example with a problem with a power plant and they
516 found that a sunflower's function could help. When it is solu-
517 tion driven you start with nature end them the problem. When
518 they apply they can do it in three steps 1) understand 2)
519 match 3) apply. He gives an example with a F16 vs. dragonfly.
520 He makes them deconstruct the problem into pieces. Together
521 with the students he finds that the problem is; protection of
522 human, active response, isolate human or remove the human,
523 prevention for passing out, pressure. He asks them if they can
524 find other analogies that can help with the specific problems
525 they found: birds, fish, water bears and evolved bacteria. He
526 then explains how the dragonfly could solve the pressure prob-
527 lem and how they made a suit based on that. He then gives them
528 an exercise where they have to do it in groups but with either
529 a car bomb or a skyscraper. Team B chose skyscraper and starts
530 to talk about problems vs. solutions. Team A, B, C and D all
531 get around 4-5 problems. All the groups enter the room for a
532 wrap up. Team C has used the function from an eye, which has a
533 mechanism of self-cleaning surface. Team D, worked with the
534 problem of preventing dirt to stay on the surface and worked
535 with coating from kutcha plants, shark teeth and the lotus
536 flower. Philip continues the lecture and explains that biomim-
537 icry is the direct transfer of problem from nature and bio-
538 inspired is less direct. He introduced a lot of different
539 kinds of methods and how it can be connected to brainstorming
540 methods.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Friday 16th August 2013

541 I enter the villa at 8.00, as I have to make the evaluation
542 schedules ready for 8.30 where they have to evaluate the first
543 week. I see that two people from Team B are there early to
544 work on the problem before the workshop starts. I hand out all
545 the evaluation schedules and collects them before the lectures
546 starts. It is difficult for them to evaluate, as they can't
547 remember everything. The lecture starts at 9.00 with enactive
548 workshop design by daved Barry. He starts by going back to his
549 last lecture and asks why mavericks never make it to the

board? Because they are too difficult and slow things down. They are socially difficult. He introduces today and they have to do acting, role-play to test their workshop design for Monday. They have to think about what they will achieve by the workshop, outcome, process, format, they have to TRY, they have to be in big groups and do feedback for one another. To illustrate he makes one of the groups do a role-play in the room. It is one of the other groups. 1 is the students, 1 is coffee, 1 is cake and 3 persons are the company people. After the role-play they give feedback. One felt lonely and uncomfortable, the company people felt that they were doing it wrong. From that they learned how to change things. The groups from each case are divided into the villa and the start the role-play in larger groups. Team A + B starts with presenting ideas 1 is Company respondent Y and 1 is student. They have a game that they want to try out. They are having a lot of fun and are laughing. The students ask "Company respondent Y": "what is innovation to you"? Company respondent Y: New, what we have never seen before. Student: "why nature?" When they have to give feedback the one playing the student did not feel scared and if Company respondent Y was stuck she needed to ask open-ended questions. Joakim asks what the difference is? Company respondent Y: "there was a lot of positive words that came to mind and they were all related." but the wanted her to rank the words so they found out that the game did not work. It is very messy and the facilitator relay has to make sure that they are on track. They have a lot of dominating people in the group and everyone wants to talk and be heard. They re-do it and this time another plays Company respondent Y and another is a student. Now they changed the game so she is to say negative words. Company respondent Y says words like Ike, boring, regular and expensive. The student asks "what about nature?" Company respondent Y: "I don't care about that". I am thinking what they are actually gaining from this. Joakim is performing a very tight facilitation of the students. They have the second round of feedback. Company respondent Y starts: "What should I do now? Was it just a waste of time. There is a lack of direction". The one playing the students felt that they just gained the same things all the time. The observers mention what was important and less important. It was their game with her words. People start discussing and Joakim interrupts "No discussion". They have two other ideas for the workshop and they want to try out the other one. They are laughing and having fun. Now some of the students are act-

ing as potential Company Y clients. One of the students is missing. They try out the workshop as three different clients. When it is time for feedback one of the students playing the client think it is difficult to figure out the role. One thinks it was easy, but what did Company respondent Y want out of the space? One thinks that they asked some of the same questions. The one plying Company respondent Y think that it just made her repeat what she already said. The observes think that they got some unexpected things. One of the observes said that they were not guiding her and it gave her more freedom. The one plying Company respondent Y said that something new came up – electricity. A new question to consider. Team D and C are doing their exercise in another room. Nina is there to help them. She askes what they think will be the hardest part? The students mention several things; to engage Company X, the balance play and seriousness, the roles and the fear of randomness. Nina helps them with setting up the exercise that they have for Company X. 3 is playing people from Company X, 1 is the students. They are standing. The student gives them the harrow point and asks them what they are thinking about when they are holding it. They can say three words. The first one says: waste and wear. The second says form, angle and efficiency. The third says sales and money. Nina asks what can go wrong here? So they try to re-act it in the worst possible manner. The first respondents say wear, waste and function. The second repeats the first and so does the third. Iteration happens and the student tried to fix it. They also talk about if other things can go wrong like breaking the ice, the purpose of the exercise and maybe they will feel silly. TEAM A + TEAM B have much iteration in the exercise and tries they workshop design over and over. It is clear that this is not only a way of preparing the workshop, but they also got a deeper understanding of the problem as they would figure out how to ask the company, what to ask them and what to focus on. By having one presenting the company to explain the problem to others. They are playing different parts of the workshop. Joakim asks how they can challenge her more. The one playing Company respondent Y says: I like to be guided or else I just go further. In general there is a lot of noise, talk and action. With the workshop the students starts to ask questions on why, by having this workshop to challenge to problem. The students start to challenge the companies' answers. Team C + D has a really high pace and lot of engagement. They are doing an exercise where they shall rate the problems. It is time for

sum up and all the teams enter the big room for a sum up. The Dyrup group tried different exercises and could see a clear outcome. CFR find out more on the problem. It was very problem-based and not straight to solution. Team C found that more people from different background could give many perspectives. Team A + B tries to ask different questions that perhaps not related directly to the case. They came way beyond normal limits. Ideas also started to evolve and they were feeling the way into the problem structure. Framing of problem started to evolve. They have a break at 12.00 and they start working further on their workshop design. They originally had 1 hour, but due to time pressure they have 3 hours to work on their workshop design + problem. I am so tired and my head is about to explode. I am so overwhelmed as the students, when both doing evaluation, observing and sitting in on lectures. It is after lunch (13.45) and I sat down for some reflection time on my own. I needed to clear my head and create a focus. What am I focussing on? Do I get the right things? Can I keep track? Or is everything just too messy for me. When I go in again in 10 min I will look at Company Y and Company X only. I can gather everything at the feedback session later. How are they working with the problem? Team A + B are working on an n exercise with Company respondent Y to get both convergence and divergence. Divergence: have her build her dream company Y location. Convergence: having her remove stuff and keep the core elements. Their problem right now is: How to add value to the company by using the outside space. It is time for feedback session and the Dyrup case starts and then comes CFR. It is Company X's turn and the audience are to give feedback, as they were policemen, rain worms or Jacobus. They talk about wear, maintenance, change, re-use or recycle and a new harrow. They want to make Company X interact and use nature at the workshop. Feedback: 'Jacobus', changing the things and collaborate. How would they do it in a group? Create something simple. Look at evolution and animals that needs sharp things. Worms, circle of life. Keep on living. Antlers from dears. It is Team A + B and they will get feedback from Corals, Daved Barry and psychologists. They talk about the initial problem that was fixed. It is changed not to a concept for outdoor space at the location which is used by all of you. They used Phillip's method to break down the problem and they found out that they were fixed on meetings room. They have made a workshop design where they will do 1) tour de company Y location. 2) Vision

681 game and 3) deconstruction the company Y location (creative
682 ranking).

Field note, Company Y Location, Monday 19th August 2013

683 I have decided to go with the Team A + B and observe their
684 workshop at the company. It is 7.30 and we meet up with Compa-
685 ny respondent Y. They ask her to give them a tour at the com-
686 pany Y location and they have divided their roles and prepared
687 questions, as they were a potential client and students. There
688 is a lot of art installation from Roskilde festival. All rooms
689 are divided into themes. It is hard for them as Company re-
690 spondent Y is very dominating at it is hard to take control
691 and follow the roles. She shows the flex rooms and office
692 spaces. There are many sponsored rooms. One asks: "as an en-
693 trepreneur how could I use the room?" She talks about network-
694 ing meetings and the lunchroom where they serve brain food.
695 Only greens. She says that they have lunch together everyday
696 at 12.00. One of the students asks: "if I were an external
697 client could I use it?" We are in the reception area. Company
698 respondent Y talks about details and that they are one big
699 family. One asks what made the difference for the people being
700 here? Company respondent Y says that it is the uniqueness and
701 people are sick of the ordinary. We are at a room that can be
702 rented out. There can be 149 people, conferences, it is in an
703 old auto repair shop. They don't advertise it. That is old
704 school. Company respondent Y says that if you have been here
705 before you will be back. All the stuff that is here is recycle
706 things. One student asks what could be changed. Company re-
707 spondent Y says that it is the area that they are doing, win-
708 dows that are not double layered. It is also a high traffic
709 area. She goes back to saying that all the things that is here
710 are free or donated which creates a unique and cool story that
711 she can sell. One asks why everything is low tech. Company re-
712 spondent Y says that there are concise, nit generic and it has
713 to be a home like feeling and not a showroom. They also have a
714 library and mediation room. After the tour they sit down with
715 her for the next exercise. They ask her to explain the best
716 case for the company Y location. There is pens for drawing +
717 props for inspiration. Without further a due she just starts
718 to draw. It is green inside out. Holistic view on things, best
719 possible surroundings for entrepreneurs for making money. They
720 want her to be more concrete. "What should it be in 3 years?"

721 She says they have the 1000 days aspiration. Camps area, liv-
722 ing facilities, Company Y retreat, membership only. She takes
723 new colours. More diversity, more stuff together. After that
724 they ask her to do the worst-case scenario. She responds pret-
725 ty fast saying, "money is gone". It is not cheap to run a
726 place like this. Company Y the company is funding this place.
727 Rent is not enough. This place is not sustainable. One askes
728 "How important is it for the company Y, that the company Y lo-
729 cation exists." One student asks if they have office here.
730 Company respondent Y thinks it is a stupid question and says
731 obviously. The companies are funding instead of entrepreneurs.
732 But they give credibility. Company respondent Y is very ab-
733 stract. They make her sum up the worst case and best case sce-
734 nario: 1) out of money, 2) municipality 2020 — they can take
735 the place back 3) bad press 4) unhappy clients and 1) new
736 partnerships 2) company Y retreat 3) sleeping facilities 4)
737 green. They have the last exercise for her where she has to
738 draw the company Y location physically. She does that and then
739 they ask her to remove elements one by one. The first thing
740 she takes away is the messy stuff, then rentals, the big con-
741 ference room, outdoor space, the hands and then lastly the
742 brain/heart. She says that she is not happy to remove the
743 brain hart it is where all the users are. The users seem more
744 important than clients. She also said that a lot of the stuff
745 is made in the workshop area (the hands). Company respondent Y
746 says that you need space and ne asks why space is important?
747 She said that you need space to work, chairs, tables and that
748 to be efficient. She also says that the area that they are
749 working on does not belong yet. If they could give it a nature
750 vibe they could rent it out and make money on it. Users will
751 use it the most, but it tells a good story to the outer world.
752 She says that they can always need more meeting facilities. It
753 can be like a showcase. One student asks if the company Y lo-
754 cation can be too big? No, she wants to have a company Y loca-
755 tion metropolis. She leaves and sums up. What did we learn?
756 They talk about the room that she wanted the store in. right
757 now it is both a lounge/meeting break room. There is a door.
758 It is cold in the winter. They learned that they are to create
759 a room that is flexible and different and inspiring. Is has to
760 be low budget or recycling. They shall take things away (like
761 electronics) to make new. They take a break for lunch. They
762 are to meet up with her after lunch and now they need to pre-
763 pare. They brought a lot of stuff for this workshop but they
764 did not use it. They talk about that they need more holistic

thinking; it is not just a brand. They have realized that Company respondent Y is not that specific as they though, she is more open now. It is more a kind of showcase. They are talking about that they are not solving a problem of creating a new meeting space, it is more the story itself! She wants to sell the story about the students. More nature — that is what is missing. Why green? Work better? When people are working better there will be better projects. They talk about how Company Y and the company Y location are very connected. The space is connecting brain/heart/hands. There is an up cycling philosophy — attention and exhibition like place. One of the students compares the company Y location to a farm whit entrepreneurs. They talk about the balance of how the users will use it and the story that Company respondent Y can present to the client. They agree that there is no problem. One of them says that they can just set up a problem and look at ourselves as the story, telling about students being inspired by nature blab bla bla. "How can we narrow this down?" "we just need to decide". They talk about if they are able to sell a concept for partners to fund? Is it a conceptual way or practical way they want to go? There is also a problem with heating in the entire company Y location that they can work on. They makes an agenda for today 1) evaluate the workshop, 2) session of brainstorm of the problem 3) which problem 4) questions for Company respondent Y. They start to evaluate the workshop with a 15 min time cap. They felt there was lack of ownership, they forgot to explain to workshop, some good questions, the deconstruction thing went well. For the future (games) they shall control it more, with the vision game they shall only bring things to use. Good at keeping track on time. The tour gave good perspectives and they had good formulations "if I were an external client…" They noticed that exercise 2 primed the words that she used in exercise 3. They talk on how to change it for next session with her, as it is difficult to ask her questions. She always has a solution for everything. They need different roles when they do it. Now they will collect some data and go around and ask the users questions. How are they living here, how are they using the space, is the space supporting etc. 2 people leaves and some are talking about what problem to choose. The students walks around and interviews + observes. They meet up at 11.00 for sum up. Company respondent Y will be back so they need to figure out what to do. They create some questions for her: how much space can we use? how much to include for the external environment? They talk about

if there is something that they missed? Should we present our understanding? Confirmation or not? One says that that will put too many constraints. Should they play a game with her? They start to talk about the interviews. One talked to an architect + researcher: someone recommended Company Y to her, it has an entrepreneurial vibe, lunch is a big thing, did not like traditional office spaces, open place where people could use each other, organic network, she was on her way and this is just a phase for her, prototyping and there could be better aqustiqs. One talked to Lucy, which is a partner: she described the place as getting knowhow, share knowledge, value based, home/family and committed. One talked to Thomas Damgaard's interns and they did not really talk with people and did not feel connected to the rest of the company Y location. One talked with a guy who had an Internet company there: he wanted something less generic, when it came to support he did not really gain anything, but it was he's own fault. He joined for lunch and mediation, he was missing warmth in the winter and more nature. I go back to the house and meet the Company X groups. They say that they have gotten new ideas that they would not have found without the workshop. The really got the edge. First they did an exercise where Company X members had to hold the harrow point and say positive + negative things about it. And then pick the most important. Then they did an exercise where they had to be creative and make animals. They brought pearls, post it, glue and other things like Lego. After they made the animal they had to pass it on and the person had to explain why this could be a good harrow point. At 13.00 there is a meeting in the big room and there is a water problem in the house and we have to move to green lighthouse the rest of the time. The admins are stressed, but the students takes it nicely they are in a good mood, as they gained a lot from the workshop and they are really happy. They have been in the big groups and now they need to split up. Not all do that. When they come to green light house team A + B have a check in. Joakim asks, "How are you". One says, "inspired", another "tired and filled up with knowledge". Now they have 2 hours of work. They will do a brainstorm. 5-10 min individually. One comes in in the middle of the exercise and did not know what to do. They start sharing and the 6 persons got the following number of ideas: 1x23, 1x20, 1x13, 1x16, 1x15 and 1x2. The have the themes/topics physical, noise, heat, drafts, transparency. One asks "should we wait to put them into boxes", on answers "no". I feel like they should just share and see what

853 comes out of it. One says, "it is very confusing, can we talk
854 one on one. They start taking turns. Joakim walks around and
855 asks what they will need tomorrow. It seems like the meeting
856 room are out of their fixation and new ideas are coming. New
857 dimensions are opening. New things like: how to collect water
858 and how to make users happy. One of them is a bit fixated by
859 all the green/nature talk, another is a bit stuck on own idea
860 about exhibition. They do not know how to select. They discuss
861 how to pick a problem and have nature as a constraint on how
862 to solve it. One says, "Should we just discuss until we reach
863 an agreement". They then pick a problem each. They split up in
864 the team A + B. team B is evaluating in vs. out. What is the
865 key problem? They want to eliminate what is not important.
866 They are very tired, and decide to go in the direction of the
867 physical area. For tomorrow they will list problem in the
868 physical area based on their discussion. They check out and
869 decide on dinner together. After the session I as them "How
870 did you select ideas from the brainstorm?". One of the stu-
871 dents looks confused at me and says "Well we discussed it to-
872 gether". This session was very tense and it was clear that
873 they needed a tool to select ideas. The Company X groups are
874 making bio-cards instead of brainstorming, as they are further
875 in the process of finding a problem.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Tuesday 20th August 2013

876 It is 9.00 and there is an intro — everything is back to nor-
877 mal and the water problem is fixed. The deliverables for the
878 week is presented. They are to do innovation themes, revised
879 context map, bio-cards and start prototyping. The double dia-
880 mond is shown and Nina points at where they are in the pro-
881 cess. It does not make sense, as this is not where they are
882 right now. She point at phase 2 but I believe that they are in
883 phase one. There is a lecture with Joakim in idea generation.
884 He says that today they are to have fun, brainstorm and be
885 positive. The outcome for today is unreasonable vision, a lot
886 of ideas and be inspired by nature. He asks how they see the
887 creative process? They answers, doing something different and
888 new. New tools, new visions, new goals. Getting inspired form
889 far out, that you cannot link directly to the problem. Explor-
890 ing the solution. Looking for something surprising. Get lucky.
891 They are to start the exercises for today and someone asks,
892 "Should we choose one problem and work with that". Joakim says

that they can always change the problem, just have a clear problem when they are working to go further. The problem is that they did not have much time to work on the problem. First they are to do a short exercise called journaling in 15 min to empty their heads. They are to do it their mother tongue. People find a place to sit. Lots of them take it seriously and some are just on the phones. I can see that some are writing about emotions. Some are sitting on the floor and other in weird positions. They are very quite. They are done and Joakim raises his hand. When he does it today they have to shot up. He asks how that was? And it is said, nice. Pretty good, I was sceptical and it worked. Off topic, don't know what I can use it for. I feel relieved. I used it for ideas. I translated the project into my own language. Joakim asks them to leave it and turn off the cell phones. Now they are to do the next exercise called future pull in 30 min. they have to create an extreme vision, which is not a solution. It has to be based on problem. It is important that they use the same colour post-its. They have to create 100 one-liners in 10 min and then find the 5 best ones. TEAM A finds 50 one-liners amongst work environment, flexible space, using the map, climate, and outside/inside. They pick the most unreasonable ones. TEAM D gets 30 and is still going. TEAM B gets 40 and clusters them in creativity, live, impact of the world. TEAM C gets 50 cluster them in positives, materials and function. Time is running out and it is difficult to select and choose for all of them. They need to sum up in the room an present: TEAM D self-repairing harrow, best companies in the world. Joakim compliments then and says it is rally unreasonable. TEAM C has a liner that animals are coping harrow point. Joakim says that they have a new vision statement now and if they have any need to revise problem. Some says that they need to go back to problem. One asks if they can start with solution and go back to problem". They have a short break and they next exercise is '100 ideas in 10 min'. They need to do 100 ideas. Team C have a really good tempo after 3 min= 21 ideas, after 7 min=49 ideas. Both Company X groups are using nature in their idea generation (both bio-mimetic and bio-inspired). The company Y groups have only bio-inspired solutions, but they di don't make the bio-cards. They get inspired as they start the exercise. Team C ends up with 63 ideas, team B got 66, team A got 55 and team D got 55. The large Dyrup case got 98. One of the students from team C says that "The fact that we made bio-cards made us more focused". It seems like unconsciously are working with con-

straint of the fact that it shall be useful and bio-inspired.
They now all have to select the best ideas from the lot before
they shall do the next exercise: brain walking but with bio-
cards. Team C has made bio cards and starts right away. Compa-
ny Y groups did not make bio cards and uses some done ones. It
seems like there is a big difference in the ideas from the
ones who made bio-cards and the ones that did not. After 5 min
team C shifts boards and works on the other ideas. After 3 ro-
tations it becomes harder and harder and they got stuck. Eve-
rybody is working very focused and they are mixing both words
+ drawings. Team B are working from the fixed cards of star-
fish, seaweed, sea urchin and shellfish. Team C, they now have
20 min to explain all the boards and choose the best ideas
from each. They got deep with the idea and the function from
nature. When they come in all present they ideas and gives
feedback to they day: "most ideas with animals", "nice tech-
niques, but stressed", bio-cards worked better than expected",
and help us converge with bio-cards". It is time for lunch and
they are to spend some time on their workstations and have a
group photo taken. The competition element in having most ide-
as really pushed them and also the fact the facilitators told
how the other groups where doing. It is time for the next lec-
ture by Rune Rex on prototyping. He asks how the idea genera-
tion have been? Many ideas or few? He makes an intro to proto-
typing and pretotyping. He also brought a lot of materials. He
presents fablab. Prototyping workshop with 3d printer, laser
cutter, both for exploring and materializing. He tells about
rapid prototyping: mock-ups and role-play (early stage for de-
veloping the idea), user driven, quick and dirty, model show-
ing pure function, 3d modelling. He says that in the divergent
phase you can use prototyping for making options and creative
decisions. Inspiration, ideation and implementation. Pretotyp-
ing is pretending something exists when stimulating the expe-
rience. The fake door. They are to do the first exercise where
they are to prototype in silence for 20 min, they are eager to
get started. There is no talk and everybody is working inde-
pendently. They have to do 20 in 20 min and it is putting them
in a lot of stress. They are fast and focused. They don't
think much, just do things. Team D makes something that looks
like harrow point. TEAM B, after 5 min they are still working
on the same. Team C, one of the prototypes looks like one of
the ideas from the brain walk. They look at their bio-cards
when working. Team A, one of them is looking at their board
from brain walk, it is the one with the foxhole. TEAM A, makes

981 something that looks like roof. They are smiling and silent.
982 One of them is looking at the constraint. They are using mate-
983 rials as paper, straws, cardboard, glue, string etc. while
984 they are creating they are surrounded by their boards from
985 brain walking, ideas, constraints, context map, problem. Team
986 B are not looking at their boards. Team A, made one prototype
987 with strings but failed, based on what they talked about. One
988 was inspired by the materials, she also though of a function
989 of a straw and a spider web. Another one was inspired by the
990 fox home (underground) and people living in the air. Another
991 one in the group worked with something scalable and flexible.
992 The last one in the group was inspired by spider, bird and
993 different levels. In total TEAM A made 13 prototypes in 20
994 min. they are to do a sum up. Team A thought it was crazy fun
995 house sculpturing like a hedgehogs. TEAM C made harrow points
996 and it was very useful, and learned about function of it and
997 heating system and friction. Team D, worked with water-cooling
998 system in the HP, inspired by eggshell. Team A takes ownership
999 of the exercise.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Wednesday 21st August 2013

1000 I enter 8.45 and join the intro by Nina. There are some chang-
1001 es in the schedule. TEAM C, they go outside to change environ-
1002 ment. They are to evaluate their prototypes that they made
1003 yesterday. They call them boy/girl names so they have some-
1004 thing to refer to. They evaluate them based on their technical
1005 knowledge. They talk a lot about friction, streamlining, func-
1006 tion and form. "We talk a lot about form, but we keep on get-
1007 ting stuck to the same form". It could be a sign of fixation,
1008 but they harrow point has also been in the villa since day
1009 one. They evaluate them based on each other. "This one is very
1010 lesbian, it is very harsh". It is easier for them to talk
1011 about how their prototypes will function in practice and how
1012 it will function in the ground by having them in their hands".
1013 Team A, they have made an agenda for today, Thursday and Fri-
1014 day with the goal of getting their deliverables done. From 9-
1015 10 they brainstorm on their problem to create a home like
1016 place and after that they are to make bio-cards to get deeper
1017 into nature. Team C, talks about how they shall use the day in
1018 terms of time and structure so they can reach the goal of hav-
1019 ing the deliverables done on Friday. There is a lot of focus
1020 on the 100 ideas "maybe we have to spilt up so someone can

work on concepts and some can work on ideas". Team B, they have made bio cards at home and they will do the brain walking from what they made. It is not clear to me what problem they have right now or if they try to reach insights to their problem with the exercise. They have also made an agenda for the next couple of days, but not as strict focus on deliverables. At 10.30 they walk through their brain walk with the bio-cards and the ideas. Amongst they have sound issues and non-tech and cheap solutions. They discuss which are the two best on each board. Evaluate on that it needs to be functional, not just aesthetic. Both team A and D are very quite. Team C moves upstairs to get some peace and quite. TEAM D, brainstorming individually on their bio-cards (brain-walking). Team A, got a total of 40 ideas from the 4 boards. At 11.30 TEAM B brainstorms on ideas. They are doing the confusion exercise, just in a very slow pace. They are struggling. Team A, talk about 'hygge', but it is hard to translate when 'hygge' is a human thing, "should we go to the zoo and look at how the animals live". "That is cheating. They do not make their own homes. They are created by humans". "But the users does not make their own home either, Company respondent Y does that". They talk about protection from cold inspired by Cushica plant, Shelter under water inspired by bio pheromone, collaboration inspired by animals + plants, housing behaving inspired by a hermit crab, warmth all year inspired by a flower amongst other things. They present the different ideas and while that they already get new ideas. They both draw and write. It is time for an inspirational lecture of trend. The lecturer explains that trends are a collective phenomenon, irrational and crazy. A trend is a tendency, conception of newness, innovation and diffusion. How is trend theory relevant? She says it is relevant as it give understanding and unfolds meaning in a context. Why trends change? It is social mechanism or status, neomania, market (fashion weeks/seasons), seduction and zeitgeist. Temporal approach of trends. It has a premise. She used nature as inspiration for explaining trends. I think it is a shallow analogy (bio-inspired). She used it descriptively. The students ask how they can use trends and benefit from them. She says to analyse a context of visual culture. One of the students from CFR explains their case and asks if they can make a trend of smoking and cleaning up. "Maybe that movember thing is a trend that supports cancer". She can't really answer the questions and just want to stop. The lecture is over and it is time to work. Team B, the brainstorm that they had

before lunch resulted in 55 ideas. Team D, they have many ide-
as, but will like to push it a bit more. They agree to re-
write their ideas they have on post-its so they know what the
actually have and where they are. They make sure that their
ideas are well described. Team A, one of them needs focus "I
would like to label the ideas". It seems like they will never
be done with the brainstorm. Discuss if they have to find a
solution of the problem and then find the function in nature.
"More physically than abstract", "What is physical for you".
They want to be more concrete and not as abstract. They are a
little stuck and do not know how to proceed. Talk about why
they are having a hard time and one of them is really tired of
bio-cards. Joakim is there to help them and asks if bio-cards
are too much of a constraint right now? "Maybe you have to go
to the far out associations. Perhaps do a negative brainstorm.
Team D, like to hear music and have some good vibes. They did
a negative brainstorm before lunch = 35 ideas. They think that
they are empty of ideas now. They work slower and the ideas
are not coming fast and easy as before. They will cluster now
to see how many ideas they have within cooling and coating.
"Even though we work slower, it is nice that our ideas are
more detailed now". They have made 2 brainstorms today. Team C
did a negative brainstorm and got 23 ideas. One of them was
using a stick as a harrow point. It is bad to turn the soil.
It is too precise. They have a very technical discussion about
angles and plow technique. They also talk about a ball as a
harrow point. It is not dangerous to change. The company can-
not make money on it. They swap it to talk about what is good
in the bad ideas. Its cheap, natural, flexible, lots of sticks
and different sizes, customize, cams is good, can works in
different kinds of soil. There is a little frustration today.
Especially TEAM B, TEAM D and TEAM A. They don't know how to
proceed. Team A quits the frustrations and starts to bake a
cake instead. At 16.00 TEAM A thinks they have found the prob-
lem. Team A makes a negative brainstorm and get 54 ideas. They
are happy, having fun and tired. "Should we share the cake
with out sister group?" one says "why are we so good at bad
ideas?". One says "mathilde is very creative" they laugh and
say that I should write that down. One says, "it should be a
home where you can laugh" there is a lot of noise and the mu-
sic starts in the other room.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Thursday 22nd August 2013

1106 I arrive at 8.45 and there is very quiet, not so many people.
1107 Team A is already here and working. They have been here since
1108 8.00. They are doing a brainstorm and need help to interpret
1109 the word ownership. They ask me how I see the word ownership.
1110 I make them explain me the context of it and explains how I
1111 take ownership of a room. A student from TEAM B comes to an-
1112 other member from TEAM A and asks if they can get their con-
1113 text map, which they did together. There are signs of sister
1114 like groups. They work together. When one group brought cake
1115 they also gave to the other one. At 9.45 team B are going on a
1116 fieldtrip to the botanical garden at Frederiksberg to do a
1117 brain waling with bio-cards. Last night they all did 8 bio-
1118 cards based on the problem inside vs. outside. So the boards
1119 are made from lightning, isolation, and boundaries. They are 4
1120 persons and there are 8 boards with post-its. They are to do
1121 the exercise for 30 min. they rotate when they cant think of
1122 more ideas. We are in the garden and it is nice and warm.
1123 Birds are singing, you can hear the water running from the
1124 lake, lots of flowers and birds. There are not that many peo-
1125 ple. After 5 min there is the first rotation. It is very calm-
1126 ing atmosphere. One of them is listening to music. New rota-
1127 tion after 5 min. they both draw and write. One of them is
1128 restless after 15 and is jumping between the boards. All have
1129 almost been at all the boards. One of them uses more time on
1130 the boards than the others. It is very cosy in the park and
1131 the doves are walking in between the boards. There is no
1132 structured way to how they walk between the boards. One of the
1133 girls is about to be done with generating ideas. Children are
1134 passing and saying hej hej. The timekeeper says, "2 mins
1135 left". I can see that there are ideas on all the boards. One
1136 says, "can I get an extra 5, there is some boards I have not
1137 seen yet". "Sure". When all is done they need to go through
1138 the ideas. They have to deal with many functions, as they have
1139 8 boards. All the boards have a bio-card, which is describing
1140 a function. They got 55 ideas equally distributed on all the
1141 boards. They are going through all the boards. Muscle: 7 ide-
1142 as, fibres for walls, easy to repair. Changing wall, living
1143 material. Fibres that changes. "How can we combine them"? "I
1144 actually did combine that one with a function from another
1145 board". It seems like many of the ideas related to muscle cre-
1146 ated ideas on walls. The next one is polar bear with its heat

1147 insulating fur. One has made a sealing, which is a combine
1148 idea with an egg. Circulation the heat. The ideas are detailed
1149 in higher degree than before, but when they evaluate the ideas
1150 it is only from what they like. Most of the ideas from this
1151 board have to do with sealing. The next board is the penguin,
1152 which also has heat-insulating fur. Here the were thinking of
1153 furniture and a chair that absorbs you. It is clear that the
1154 ideas are more biomimicry than bio-inspired. The more the stu-
1155 dents worked with the bio-cards the more their solutions were
1156 biomimicry than bio-inspired design. The big difference is
1157 that this group who worked with later on (compared to team C)
1158 got more crazy ideas whilst still using biomimicry. I can see
1159 and here from them that a lot of the bio-cards are combined in
1160 the ideas. They also start to talk about anti gravity. Great
1161 divergence. The next board is from a bird's nest and how it
1162 keeps warm. They get a lot of ideas in the area of recycling,
1163 by having ideas on recycling. Will also looked at Mette while
1164 doing the exercise and she was walking around on light toes
1165 and he got the idea of having small stones to keep warmth.
1166 They also talk about compost. When they are going through the
1167 boards they are also picking the ones they like the most and
1168 they have a tendency of picking the ones that a drawn and the
1169 ones that are the most detailed. There is a tendency of selec-
1170 tion that is forming when they are going through the boards.
1171 It is the student that is holding the pen and most dominating
1172 that does the selection while they are discussing. In addi-
1173 tion, it is not clear what they are selecting for and how they
1174 will use the selected ideas later. It is not the first time I
1175 have seen them do this after a brainstorm. The next board is
1176 an olive tree and how it guides the light. From that they got
1177 a lot of aesthetic ideas. Robber bladder idea, use rainwater.
1178 They also had a board with an ICE plants that steers water on
1179 the surface. From that they also got ideas related to walls.
1180 The plant gave ideas on how to collect and release water, roof
1181 that collects water, ice as isolation, heat, pressure and
1182 light ideas. They had a board with barriers from the shark,
1183 which gave most ideas oh how to decrease wind. They got ideas
1184 such as tree house, tree wail. New idea came while they went
1185 through the boards and the automatically started o combine.
1186 They go back to the villa at 11.45. When I got back TEAM A are
1187 well of working towards the 100 ideas. They have made brain-
1188 storming on the table. They got 65 ideas from the themes Peo-
1189 ple & behaviour, ownership, identity, tools and technology.
1190 They did the exercise from regular brainstorm and not bio-

1191 inspired or bio-mimetic. They will move on making a brainstorm
1192 with bio-cards. TEAM D, discussed ideas and came-up with 3
1193 ideas that they will like to talk to experts about. Technolo-
1194 gisk institute on coating and friction. One says, "Is this
1195 enough out of the box". They have a carbon-idea, which is
1196 changing the meaning of the harrow. There is carbon in the
1197 ground but it goes away. If there was carbon in the harrow,
1198 the soil could be nurtured (problems are technical). They are
1199 in a phase where they have good ideas, but they need knowledge
1200 about technicalities. "Where is the inspiration from nature"
1201 they have to try and backtrack it. "They are all inspired and
1202 we developed them so much". They now have a lecture in presen-
1203 tation techniques by Majse. She is presenting techniques for
1204 relaxing, jumping, working with voice. Talking slow vs. fasten
1205 up, high vs. low. She talks about logos, pathos and ethos.
1206 They shall mix it and make it interesting. She makes an anec-
1207 dote about a nervosa presenter. They could all feel that she
1208 was nervous but she was prepared. She explains about story-
1209 telling, beginning, middle and end. They have to start with
1210 some action, image, make them curious. Not make audience con-
1211 fused. Put it in a context. Hope vs. fear. She presents a mod-
1212 el as a narrative and now they have to make their own narra-
1213 tive. She asks what they can do in a room where it is not just
1214 talking: surprise, humour, activate audience, lights, take
1215 turns when you talk, focus just on one person.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Friday 23rd August 2013

1216 I arrive at 8.15 and need to get started with the evaluation.
1217 Cille and Pernille are here. It is very calm and some people
1218 are already working in silence. I start the evaluation at
1219 8.30. At 9.00 there is an intro, where they get information
1220 for the presentation that they are doing today. After the in-
1221 tro the first lecture starts which is introduction to idea se-
1222 lection and concept design by Balder. He explains that an idea
1223 is: something to explore the problem. The idea is testing the
1224 problem. A concept is: testing the solution. It is a descrip-
1225 tion on how you solve the problem with the solution. He intro-
1226 duced a matrix where you have Possible vs. impossible at the
1227 Y-axis and Incremental vs. radical at the x-axis. Once you
1228 have put all your ideas in the matrix you can start to cluster
1229 them. Some are asking "why radical" and "what about the obvi-
1230 ous". He says that they are to create an innovation and that

1231 is why radical is important. He then goes on with forced idea
1232 paring and how to go from idea to concept. He then explains
1233 how all this is related to prototyping. Prototyping is trying
1234 out an idea. So you are testing an element of your concept. So
1235 the concept is based in their ideas. To discuss the concepts
1236 or ideas together he presents methods for evaluating them. The
1237 first one is the morphology chart, which is mechanical. The
1238 second one is mathematical where you weighted the ide-
1239 as/concepts. He advice them to use fewer variables (o, 3, 5 or
1240 Yes, Maybe, NO) if they do not have much knowledge about the
1241 problem. Also, he says, "trust your got feeling" as your body
1242 realizes before your mind. He provides an idea checklist: 1)
1243 Are all ideas part of your selection process? 2) Are we happy
1244 with variety of ideas? 3) Have all ideas been given a fair
1245 chance? 4) Have we ditched our darlings? 5) Are we still de-
1246 veloping on the ideas? 6) Are we clear on the actual selection
1247 criteria? He also have a concept checklist for them: 1) are
1248 all good ideas part of (or at least one) the concept? 2) Are
1249 the final concept comparable (details)? 3) Can the concepts be
1250 merged? 4) Have we parked our favourite? 5) Have we asked ex-
1251 ternals? 6) Are we clear on actual selection criteria?
1252 A student asks, "How many ideas shall we bring in?" it is
1253 9.45 and TEAM A is sitting with Joakim. TEAM D, starts to use
1254 what they just learned from Balder. "Ideas are to test prob-
1255 lems not solutions in them selves". They say that they will
1256 start clustering as they just learned from Balder. They talk
1257 about how ideas are not the solution in itself. They start to
1258 collect their ideas from their problem statement. TEAM A, "we
1259 should have had that tool on Monday", they are a bit frustrat-
1260 ed that they did not learn it before as it could have helped
1261 them. TEAM C, is working on their presentation. "We have al-
1262 ready done the morphology and weigting as we knew them new the
1263 tool from beforehans". They have made 10 evaluations crite-
1264 ria's and chosen 3 concepts from these. They call them
1265 Joakimi, Pascale and Boris. "I thought that Boris was hope-
1266 less, but it has a lot of possibilities. TEAM D, While they
1267 were clustering they created new categorize: How to make a
1268 harrow = 9, Alternative to harrow = 4, How to make it fun =
1269 15, How to use less material = 5, How to extend the lifetime =
1270 10, How to strengthen the harrow = 20, how to optimize the
1271 process = 8, additional function = 2, reduce fiction = 13 and
1272 reduce heat = 17. "We have a lot on functionality, so we need
1273 to go in the direction of environment and how to make it fun".
1274 They start a new brainstorm. When making the categorize we had

some bad ideas that could not fit so we created new ones — how
to make it fun. TEAM B, they are walking around and collecting
things for prototypes, bubble palst, mirrors (they talked
about mirrors yesterday). They want to show the process of
ideation and leave it open in the presentation. The audience
should be able to go back in the ideation process. I am having
fun while observing, friendship are evolving with the stu-
dents. They are using the bubble plast for the penguin chair.
They are making a chair with bubble plast based on their idea
from yesterday. The penguin's feathers can travel small bub-
bles of air both in water and air. A chair where you can wrap
yourself in the "coat". Of a penguin. TEAM A, is also making
prototypes. TEAM D, are having a break while building their
monkey. TEAM B, a discussing which ideas to choose. One of
them will have one of he's own ideas in the presentation that
which is on the idea parking lot. The others want the ideas
that they have chosen together. It is time for the presenta-
tion and groups are divided in half, so half of the groups are
presenting upstairs and the other half down stairs so there
will be more time for feedback. I am sitting down stairs and
have put a video recorder upstairs so I can view the presenta-
tion afterwards. TEAM C, they present what they have gained
from the company workshop. They got new knowledge from that
and noticed their history of decrease in growth. There is a
conflict of butter in the bread vs. innovation. They got a new
insight to the problem. There is competition with BRICK coun-
tries. Also the company wants to students to think out of the
box, but not too far out. There are different wants and needs.
The students want to go in a different direction and go far
out. They present their use of bio-cards that inspired them
with functional elements from animals. E.g. sea star that can
regulate temperature and deal with friction. They used mor-
phology chart and 3 different concepts came out of that. They
are closing down. One says, "We are still far out". They pre-
sent the three concepts 1) Joakimi: termite, scorpion and
chemistry. 2) Pascale: sand fish, snake. 3) Boris: razor clam.
They also did a field study to test the first prototype. The
field study is not real, but more like a gimmick. They ones
they 'tested' were ideas not concepts. Annette stars with
feedback: she thinks they had many examples and used biomimic-
ry + they had many different functions. Whe asks, "Where will
you end up". One answers and says that the next step is to do
a value chart, pick ideas. Out of the 100 they picked 15 and
build it down to these 3. Their problem is to increase life-

time of harrow. "We are deep in the function, and we are eval-
uating the same things from different angles". Nina gives and
advice that they should prioritize the criteria's and see if
some of them are competing. They get more feedback from their
facilitator that challenges them and says that the other team
went through the same problem. "But what is actually the prob-
lem? Will people use it? Isn't the problem butter on the bread
vs. innovation. Isn't the problem that the company can't think
out of the box?" There is one student in the audience that
gives feedback and says, "what does a harrow do? And do you
actually need a harrow for that job?" They get feedback on the
fact that they are focusing a lot on the function. I am think-
ing that they have had the harrow in front of them the entire
time. One of the other lecturers mentions that the company al-
ready worked with making a harrow that can last longer, but no
one would by it. It was brought up the first day, but it seems
like all of them forgot. Including the facilitators. They talk
about the heat problem that came up during the company work-
shop when they had to explain 3 negative things about the har-
row. So there were two different problems that generated more
ideas. "They would probably not have mentioned it if they were
just talking to them". Rikke "what is the potential if you
solved the heat problem"? They say that other companies are
copying their products down to the shape. The group has been
very challenged by the problem. It seems like they don't have
steady problem. Why is it a surprise for the facilitators that
they do not have a clear problem? Why is it only showing now
for the facilitator and the group that the company already had
a solution that makes the harrow last longer, but no one want
to buy?
It is TEAM B, time to present. They start with a line: do you
love nature? Sometimes nature sucks. If you are outside all
the time you will die. It is a creative way of showing their
problem. They show the context map and say that they decided
to ignore it. And says fuck all the constraints of the fact
that it has to be funded. We will put on the constraint next
week. They explain that they had done 3 brain walks + storms.
They are working with the innovation theme blurred boundaries
and light. They have some prototypes to present: penguin
chair, pinecone, engaging people, colorfish, clouds (mirrors.
It is fun and a bit messy. They have also handed out the bio
cards that they worked with. Annette starts with feedback, she
says that they used the bio cards in a nice way (she was not
here from the beginning. Joakim says that they are far out in

1363 terms of the inspiration. "But is it a need or a problem they
1364 are solving? Can people actually use it?" They get feedback in
1365 regards to put them selves more into the presentation and I
1366 tell them how to. They could e.g. tell about the company work-
1367 shop where they gained new insights the problem that did not
1368 exist.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Monday 26th August 2013

1369 TEAM D, after the presentation and feedback session they have
1370 many doubts about the problem, and they need help from the fa-
1371 cilitator to change it. "Are we just to give them inspira-
1372 tion?" "Shall we make them think out of the box?" The facili-
1373 tator advises them to go back to the problem. "We have these
1374 three ideas and it is random how we put them together". "We
1375 can go back and put them together in a new way". There are re-
1376 ally doubting their work after Friday and they are so frus-
1377 trated, the feel like all their work is useless. One of the
1378 students tries to cheer them up "we should underestimate our-
1379 selves". "We can go back and put them together again, we have
1380 the knowledge and the resources for it". They are discussing
1381 if the should end up with a concept or inspiration. One sug-
1382 gests stat they can give them a concept and a catalogue of
1383 ideas. Nina comes with a handout of deliverables. There is a
1384 lot of doubt. She tries to ask Rikke, but there is no real an-
1385 swer. TEAM D continues the discussion "perhaps it is a visual
1386 problem, as the company already have made a harrow that lasted
1387 longer but looked the same". The facilitator says that perhaps
1388 they need some input on process and methods. They like to be
1389 innovative but give you a concrete problem. Perhaps use some-
1390 thing from your vision". One of the students says that tomor-
1391 row at the feedback session she thinks that they have to pick
1392 some of the concepts to get feedback on". The facilitator sug-
1393 gests that they should use the matrix to judge that". "Yes,
1394 because we have already done the morphology chart". They like
1395 to be more considered and not as random. "We have to pick one
1396 now". Facilitator: "then you have something to relate to". One
1397 says, "it will be something with fun", another says "I am
1398 still open for it". The facilitator says that it happens that
1399 she was at a thing in the weekend where her cousin was. He
1400 sells the company's products and they were bad quality. One of
1401 them comes back, he had put them on the list for all the feed-
1402 back sessions. "Let us make a plan for today". They write up:

revise problem formulation, develop 3 concepts and the idea portfolio. They start to revise the problem. They like to inspire the company and dive into how one can use them. They also talk about the evaluation criteria. "Shall we remove some? Maybe form or function?" "What about visual?" "Shall we make it more specific?" "Shall we go through out concepts?" "Maybe we have to develop them a bit before we evaluate them". The want to explore a bit more if the concepts can work and they decide to explore them more before the evaluate them. TEAM B, doing evaluation criteria + demands: nice to have vs. need to have. Demands are the constraints. They make an agenda showing convergence. TEAM A, some of them are going to Company Y location to gain new insights/narrow the scope. They want to focus more in usage and talk more to people and focus on one specific scope. TEAM B, starts doing the matrix possible/impossible and radical/incremental. They are going through all the ideas together, but they are a bit confused. Is it concepts or ideas? If it is a concept it goes out. When they go through the ideas they are having fun. One keeps referring to it if it is expensive enough, but that is not part of the matrix. They are fooling, not much progress is happening. They talk about the ideas and get the refreshed. They spend a lot of time on it. They can remember many of the ideas, as they are not detailed. After on hour they have sorted all their ideas + initial ideas from the parking lot. Possible/radical = 40, possible/incremental = 30, impossible/radical = 23 and impossible/incremental = 30. They start moving them around. TEAM C, I go upstairs and ask them if they will do a matrix, but they think it is too late. We are much further now, but we will like to do it for the overview. TEAM B, they start combining them to move as much as possible to possible/radical. There is confusing about combining, cluster or changing ideas. They start to talk about if they can prototype this week. Talk a lot about if it is possible or not. At 13.00 TEAM A comes back after been talking to users. The students say that the users had difficulties to describe what they were using the company Y location fore, and the only thing they did together was to eat lunch. The ones from the 'hands' were separated from the brain, as they would not identify them selves as business. One of the students talks about how many are discussing the feedback they got on Friday and it was especially specific comments from one lecturer that knocked them down. It was about the link between their ideas and Company Y. Why are they to use it? They decide to get a feedback session with Annette.

They agree to sit down and talk about what they have discov-
ered. There suppose to be 40 users, but there were only 10.
They spoke to 5. 2 were Company respondent Y's trainees. One
of them was a project leader and she was there everyday from
9-17. She said that there was not much cooperation between
people. The people talked about an urban garden, but were very
primed by Company respondent Y as her trainee. People used
mostly Friday bar and lunch thing. They talked to Silas that
was Thomas Damgaard's employee. He had another perspective on
the out door space. To him it was a parking lot and nothing
permanent was outside. They talk about, that perhaps the roof
could be the connection. "They use the other things that are
there, so we must create something that is not there". They
talk about how social things happened in main building with
lunch or bar. "It will be hard to find something that can be
used by everyone". "We should decide on whom as the need are
different". "Can't it be flexible?" They start clustering.
TEAM C are doing an agenda for today. TEAM A, works with prob-
lem again. It is a co-evolution of problem and solution. It is
very challenging for me to keep track on the different group's
processes as they go east and west. TEAM B, goes back to the
same problem that TEAM A, Joakim asks what is the human usage?
What are the use and not only a function. E.g. sky room, could
be a place for visions. When they are there they will have a
specific feeling. It is very different from team member to
team member what they need. Some wants to make a clear deci-
sion and get further in the process and some wants to develop
more. Joakim says that they are developing a function and not
meaning. One of the students says that they should make their
own argument of what make sense. They talk about if they are
mixing up on what the users need and what they want. "Can we
prototype it?" "This is not the concept right?" Joakim cuts
through "make a list on what you need to discuss". It reminds
me that I told Nina earlier in the day that conflict would
arise and I was right. It is too difficult for them to choose
what to doo. How to proceed in this chaos. How to converge
once you have been EXTREMLY divergent. Maybe creativity on
such a "large" scale makes it hard in the innovation process
to converge. Perhaps the level of creativity affects the pro-
cess at large. Perhaps creativity is more useful in smaller
portions TEAM C and TEAM D has not been that divergent as TEAM
A and TEAM B and they have it easier with converging. TEAM B,
talks about a new meaning with the space: nature, inspiration,
relaxing. A room where the users can be divergent and generate

1491 creative thinking. TEAM A, is brainstorming on usage based on
1492 the knowledge from the visit. Is it in the iteration that the
1493 creativity sparks, as the ones that did not go so as far still
1494 is creative? TEAM B, they go through their new ideas and com-
1495 bines them with the old ideas. They are more detailed and
1496 works with many functions. They are good at taking breaks to-
1497 day. They change table where it is not as messy. Brainstorm
1498 resulted in 1x4, 1x8, 1x3, and 1x8. They got fewer ideas but
1499 more detailed and they are also combined. Sign of divergence.
1500 TEAM D, made 7 clusters of ideas: product: 76, environment:
1501 17, social matters: 13, new markets: 31, fun: 15, additional
1502 functions: 7, company solving own problem: 5. They are making
1503 criteria: different direction than the company. "Should we
1504 come up with one each?". TEAM C, they are going through their
1505 drawings. "Do we still have the analogies?" "Yes". They say
1506 that all the concepts are doable and that they found out after
1507 they did the technical drawings. They are discussing if they
1508 have any favourites. They have chosen three. It is the ones
1509 that they need to evaluate. TEAM B starts to do the morphology
1510 chart + combines. TEAM A is making a matrix all criteria/few
1511 criteria at the y-axis and impossible/possible at the x-axis.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Tuesday 27th August 2013

1512 The day starts with introduction. They are to have counselling
1513 sessions with Torben, Thure and Annette. At 9.00 TEAM A is to
1514 have a counselling session with Thure. They have put all their
1515 ideas and bio cards up. They present their case to him. They
1516 talk about experience economy, consultancy. Thure: "do you
1517 know these people?". Everything is a bit messy. Thure: "what
1518 is the function of the place?" Will: "we had a big discussion
1519 about that". Mette: A place where they can be diver-
1520 gent/creative. She explains that they did a lot of bio-cards
1521 and ideas from this. Now they want to combine ideas into con-
1522 cepts. She asks if there are other areas that they can look
1523 into? Thure: "well how much time do you have?" He gives a
1524 brief description: plants, biology, evolution. They present
1525 the muscle idea, hedgehog idea, onion idea, feather wall,
1526 birds nest, webs that brings down floor and roof. Thure asks
1527 what he's role is now. He continues as says the functional as-
1528 pect is special. You want to have a function where people get
1529 inspired. That is the easiest solution. These functions here
1530 are difficult, as you want to have it in winter. So the isola-

1531 tion aspect is quiet a constraint. The idea about vertical
1532 space is interesting. He asks them if they are constrained by
1533 economy here. One of the students yes "Yes and No", it depends
1534 on if they can get funding. They ask Thure about moss and if
1535 they can use it for isolation. They have a lot of different
1536 things they need to get feedback on and it is very messy. He
1537 says that there is trouble with moss and the roots. There are
1538 other options you need to have water coming down from the
1539 walls. He asks if the place is south placed? One if the stu-
1540 dents say that it is north placed. Thure: "that is something
1541 that you have to look at. You can direct the light and play
1542 with light. Get the light in and out". They are discussing
1543 light and how they can absorb the light. Thure: "perhaps it is
1544 already there". TEAM A has counselling session with Annette.
1545 One of them starts by telling that she is the only one that
1546 they have booked for the counselling session because they
1547 still are at a very abstract state, unfortunately. They show
1548 they prototypes, inspired by animals as constructors. "We have
1549 had bypassed to think about how people should use the room. We
1550 then made some criteria, which are more traditional. So bio-
1551 inspired by nature became more as a process." Annette: "maybe
1552 you can go back to some of the things that you have made". One
1553 of the other students says: "we can for sure make al sorts of
1554 crazy things from nature, but can they actually use it?" It
1555 seems like the were more creative with the constraints of 1)
1556 have to make a room 2) that they have to make it bio-inspired
1557 but with 3) it has to have a function, made them less crea-
1558 tive. Annette: "you have been super creative, but have you
1559 moved towards whether or not it can be used? Isn't it the cre-
1560 ative that they want? You have to make a connection between
1561 the two". One says that they have talked about if they could
1562 adapt it to the seasons. Annette says that they have a lot of
1563 work with making it more concrete. They say that at Friday it
1564 was made very clear for them that they were missing the link
1565 to the location. It is a balance, because they could easily
1566 create something that is cool, but if they could use it or
1567 not? "We are lacking the red threat that is connecting every-
1568 thing". Annette: "use some of your ideas. They say that if
1569 they can find a user scenario then they would have a lot of
1570 ideas. "But they are not missing anything". Annette: "if they
1571 say that they are not lacking anything, why are afraid then?".
1572 TEAM C is having a session with Torben. Torben: "how did you
1573 arrive at the solution?". One of them answers: "from brain
1574 walk, brainstorm and morphology. They were also combined".

1575   They have three concepts the first on is very inspired by the
1576   sandfish. Torben asks if the know the principle. One of the
1577   students says that it is very flexible, and it distributes the
1578   pressure on different shells and keeps the heat away. It is
1579   also inspired by the stoneflies. This solution of a harrow
1580   point that keeps the heat away and it has modules that can be
1581   clicked on. The second one is inspired by the mussel. It has a
1582   drill that loosens the soil up above the shield it self. Then
1583   the harrow point can be made out of a lighter and cheaper ma-
1584   terial that the will be no mechanical wear on. The third one
1585   is called Joakimi and it has small grooves. The core is metal
1586   with high heat capacity to direct the heat. Torben asks what
1587   inspired them for this. It is the rat teeth that keep on being
1588   sharp. Torben asks about the heat core. They say that they are
1589   on the hunt for metal that can be heat conducting and maybe a
1590   bioplast. He asks how they will make sure that it is sharp.
1591   They say that it has to be sharp, just not blunt. Torben
1592   starts to discuss the screw and mounting and that they can go
1593   back and look at the fortress of nails and they are stuck on
1594   the finger. Can I hold the little harrow point. Torben starts
1595   to challenge the mounting, but that they can delimit. Torben
1596   returns to number 2. The challenge is here to keep the drill
1597   rotating. One of the students asks Torben: "if you should be
1598   one of the concepts which one would you be?". He just says
1599   that they should get an overview of three concepts and what
1600   they should be able to do. He asks how many biological con-
1601   cepts they have "2-3 on each, but we have mad many brainstorms
1602   and one concepts has inspired us to new ones". Torben says
1603   that if it holds the geometric it can turn faster. He says
1604   that they have to remember to have the red thread. After that
1605   Torben are to have a counselling session with TEAM B. Torben
1606   starts to talk about how they can create an outlined process
1607   that they can sell to Company Y. One of the students asks:
1608   "how can we get on from here? We have a lot of inspiration and
1609   ideas and the challenge is to combine it into a concept". An-
1610   other adds that they struggled with combining. Torben says
1611   that the concepts a fairly overall and general. One the stu-
1612   dents show him one "this one is isolation". Torben: "what
1613   kind of isolation?". They go through the other concepts. Tor-
1614   ben: "should it be a construction or temporarily?". "Construc-
1615   tion". Torben: "one things is to make constructions a sur-
1616   roundings, and another is to create surroundings around you.
1617   You have temperature, rain and wind and that can be solved by
1618   suits. The problem is that if you make a building you go away

1619 from nature, if you create something for the individual you
1620 are in nature. One of them explains that they had already been
1621 there, but it was not radical enough. I can see that they only
1622 get general feedback, as they do not have anything concrete.
1623 Torben asks: "hoe did you come here? Can you go through con-
1624 cepts on what is the inspiration". They talk in many direc-
1625 tions "inspiration from people, from being there". There are a
1626 lot of mirrors in their ideas. Torben: "can you feel comforta-
1627 ble here and is it innovative? And will it keep on being inno-
1628 vative? Make a list on what is innovative". He encourages them
1629 to go back to the evaluation and start to rate them and se-
1630 lect. TEAM D, they are working on their concepts before their
1631 counselling session. I ask one of the students from TEAM A if
1632 they got something useful from the feedback. He thinks it was
1633 useful, but also difficult as they are at a difficult stage
1634 where they are not ware of what they want. TEAM D, preparing
1635 questions for Torben. The facilitator is there and is there
1636 and says, "You know from my fathers customers that they have
1637 bad service and long time giving feedback". "Yes it was really
1638 good that you said that". At 11.30 they have the counselling
1639 session with Torben. "Should we show concepts or innovation
1640 themes?". They are having trouble figuring out where they are,
1641 as they do not know what to show him". Torben: "can we start
1642 with the problem?". One of the students answers: " The company
1643 told us that it was the wearing. The two first weeks we fo-
1644 cused on that, we had many ideas on cooling systems, heat,
1645 friction and ideas more related to this. Friday we changed
1646 scope after getting feedback. Maybe it is a more general prob-
1647 lem". They talk about that it is within Company X and that
1648 they already made a harrow point that lasts for long. They
1649 talk about that the problem might not be so functional. They
1650 show him the innovation themes. "First we made concepts from
1651 all themes, but we chose 4 innovation themes in the end".
1652 Those are 1) product, 2) environment, 3) additional services
1653 and 4) marketing. They say that when they made concepts from
1654 those 4 it worked better than when they made concepts from all
1655 themes. They arrive at the first question to Torben: How to
1656 strengthen the material? They talk about the bloodworm and
1657 Torben asks what the wear mechanism is? They say that heat
1658 creates wear and therefore they did a lot on cooling. One adds
1659 that that was not the problem. They already made a long last-
1660 ing product but could not sell it. They go to next question:
1661 What is companies experience with biomimicry? Torben says that
1662 it is not different from another advanced new design method.

It is very challenging. People stick to what they know. Easier with students that are trained in it. They are reluctant to try it. One talk about what the play showed vs. solutions for changing it. The facilitator is there and asks "do you want to deliver or challenge? How to balance that?". I can see that Torben is a bit hesitant to answer that, but says that he would challenge them. "If you just please them then you just give them what they expect". They talk about a new problem: how to do biomimicry marketing?. One says that maybe it should be a framework. Torben says that maybe they should give them ideas on the road to follow. New ways of looking on wear. Product could be an example and marketing could be wrapping it up. The session is done and briefly leave and get back after 10 min. when I get back to TEAM D the facilitator is very concerned about the students. Many of them are worried if they used bio enough and if they will fail. Now they will try to connect the dots. At 13.30 TEAM B is sitting calmly together in the couch and looking at the their wall of concepts while evaluating them based on their criteria. They are tired and a bit silly. They talk about their criteria, they needs to be revised. One starts to remove some of them without the others awareness. At 13.47 TEAM A are making criteria for outside inside home. They have different categorise of criteria. Activity: unique, dare, social, should be for users. They also have included weather, function under different weather, include our "hybrid" construction. After that they start a negative brainstorm. After 15 min they are not so detailed and goes back to the general level. At the same time they make elements for what it should contain based on the ideas they have to be more specific. They like to go deeper in what the activity criteria should contain. Some of the elements are people and green. Some of the negative elements are could and antisocial. There is a bit of confusion. Julian was suppose to have counselling session tomorrow, but will have them today. Lykke Friis is also coming to ask questions. There is a lot that the students shall consider today and their concepts are twisted and turned. At 14.00 TEAM C have rated their three concepts from 17 different criteria. They are rated 124, 158 and 178. One of them means that they have picked one, but another member says that just because it got more it is not final. They need to look at the two other concepts and combine what worked better in some of the other ratings. They will try to combine it until it will be perfect. At 14.08 TEAM B are sitting and looking on their criteria. They have removed some and put in

1707 some new ones. TEAM D, have split up on 5 concepts and are de-
1708 veloping them individually before the feedback session with
1709 Julian. TEAM A have got some more negative elements: boring,
1710 something they have, not closed.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Wednesday 28th August 2013

1711 When I arrive at 9.00 I can see that TEAM B have rated 6 con-
1712 cepts based on 12 criteria= 873, 1094,m 982, 928, 1057 and
1713 784. TEAM A is giving feedback to TEAM B based on their rat-
1714 ing. One from TEAM A says, "It seems like all the ideas would
1715 function better in the summer". Another from TEAM A: "I like
1716 concept 5, it is very different". One adds " concept 4 has a
1717 problem by having too much. The other seems more simple". TEAM
1718 A is lacking behind so they are joking with the fact that may-
1719 be they should have one of TEAM B's ideas. TEAM A is giving
1720 very positive feedback to the concepts, they are simple and
1721 flexible. TEAM A one leaves and TEAM B starts to talk about
1722 the goal for today. They discussed whether is should be one
1723 final concept in the end of the day. They will divide up the
1724 work so one can start to write the report. One of them thinks
1725 that they should take a concept each and develop them further.
1726 They are very tired. One student is going through the concepts
1727 and what she think is interesting and which ones she would
1728 like to work with. It is the ones with highest rating that
1729 they like the most. The next one then ones through them and
1730 what she thinks is interesting. TEAM A, I can see that they
1731 have worked a lot until very late the day before. I can see
1732 that they have done many exercises: brainstorms, cluster, and
1733 matrix. They have been very divergent and then convergent.
1734 They also have a lot to catch up on. One of the girls is
1735 standing and developing ideas, while the two others are look-
1736 ing. It wonders me how much bio-inspiration they are using.
1737 They did not really use it yesterday and it seems like they
1738 are not doing it today either. TEAM C is really calm and is
1739 sitting and working individually. They are doing the report.
1740 The facilitator comes in and asks how far they are. They have
1741 narrowed it down to one concept and now they are working on
1742 the details. The facilitator asks what Julian said to them.
1743 "He said that it was all wrong and brainstorm was a bad
1744 thing". One says that the brainstorm had opened the solution
1745 space and they had found 100 ideas. They laugh about their ex-
1746 perience with him, but they did not get anything constructive

out of it. "He said that our animal analogies was bad and we did in a wrong way". TEAM C chose the one concept based on rating. Where they scored lowest they tried to fix it. TEAM D, they are down to three concepts now. "we spend the afternoon yesterday to develop the five concepts and chose the three best after our meeting with Julian giving feedback. He told us that two of the concepts was not doable". They had bad dynamics in the group but Julian boosted their confidence and it has been good for them. They talk a lot about the marketing now, but it is not a democratic decision. At 10. TEAM A are sitting drawing one says "what is it actually we are doing now". They starts a brainstorm based on work & play individually for 30 min. it gave 6 ideas that they have put on the wall. After they have put them up they get twice as many ideas when being inspired by one another. It is very quiet. It is difficult to see where the ideas come from, but they say that the ideas are not new. They are from earlier where they created good ideas, but now they are just more focused. So even though they are not using bio-directly they still have the knowledge from before that they are using. They session with Julian seems like being good for them and he gave them a link to hoe the room could be flexible. It is a topic that they have worked a lot with, but they could not grasp it. At 10.45 team B have removed 2 concepts and are down to 4. They start to develop the last 4 with prototyping and drawings. I can see that it was not the ones with highest rating that was chosen. They have taken one of the concepts that got low rating and found a way to improve it. They talk about the gut feeling and how they did the rating in a fast way. TEAM A is back at the inflatable room. TEAM D, they are gathered and work vividly on prototypes and drawings to improve their concepts. It is very functional exploration, but there are different opinions on how the function should be. Should it be realistic or not? At 11.30 Annette and Phil are having a talk about exam formalities in the big room. After that there is a lecture with Julian Vincent. Philip introduces him as one of the greater experts within the field. He starts to talk about the bridge between biology and engineering. Different methods and doings. Goes through how language about the field developed. The word biomimetic goes back to the 50s. Different words are used from people depending on their domain. Biomimetic is the abstraction (now implementation) of good design from nature. He comes with negative comments about the methods they used like asknature.org, calls it naïve and rubbish. He has a small ex-

1791 ercise. There are things we don't know that we know. He talks
1792 about creativity. Combining known knowledge. Breaking down the
1793 boxes in which you store information. New exercise: draw an
1794 anchor in the air. People do it and it confines them. Then
1795 draw the function of an anchor. People do it an it releases
1796 them. You are allowed to move out of the context that it is
1797 put into. He asks, what is the function of a fridge? Freeze
1798 water. How do you anchor a boat with a fridge? Freeze the wa-
1799 ter. He encourages them to define the function rather than ob-
1800 jects. He goes on with examples of biomimetic: nylon, Velcro,
1801 lotusan. He shows structures inspired by nature: fish, leaves.
1802 TEAM A has almost decided on a concept 'Folding', they had
1803 talked about flexibility and inflatable rooms, but they got
1804 the direct link from Julian and his slides today. The inspira-
1805 tion was from a construction of a fish mouth. Now they are
1806 making prototypes of straws. I am very surprised that they
1807 came up with something, as they seem so lost the other day. I
1808 ask one of them how they came up with the concept "we have
1809 converged and diverged and now we converge because of need.
1810 Perhaps not because we are in a good place". TEAM B is also
1811 making prototypes. TEAM D, making prototypes and it helps them
1812 communicate as it forces them to relate to them. TEAM A is
1813 talking to Julian about their straw thing; it is almost like
1814 they are getting his confirmation. TEAM B has eliminated a
1815 concept after they did prototypes on it. It made them realise
1816 that it could not be done. TEAM A discusses how much time they
1817 have left and how deep in the details they should go.

Field note, Grundtvigsvej 25, 2000 Frederiksberg, Thursday 29th August 2013

1818 TEAM B are sitting and working on the report — very quiet. Af-
1819 ter I left yesterday they made three prototypes done. They
1820 have made a to do for today. One of them is doing drawings.
1821 TEAM A after I left yesterday they have worked further with
1822 their prototypes, and they have gotten a better understanding
1823 of the surfaces. TEAM D, they are consulting Nina in their
1824 presentation technique. They like to get feedback on wording,
1825 seriousness, real, enthusiasm etc. Nina says, do it as you
1826 will do it. They have some slides that start with their final
1827 problem: wearing, changing, soil and sale. They also show
1828 their inspiration from nature. Nina gives feedback and says,
1829 you did well. Building up suspense from the beginning (that
1830 they learned from Majse). It should be more guiding. Then they

1831 like to hear about their problem vs. the company's problem.
1832 Nina asks if they came up with the problem after being pre-
1833 sented to Company X. What about a crazy solution for enter-
1834 tainment. They discuss what they what with this presentation.
1835 They like to change their mind-set through their presentation
1836 with their perspectives, in a way that is respectful and de-
1837 cent. TEAM C is not here they are at DTU innovatorium to make
1838 final prototypes. TEAM A, two of the group members are here.
1839 They are doing prototypes in silence, it is now that they re-
1840 ally have to move fast. TEAM D, works in silence. TEAM A they
1841 are working with foam core to make a 1:1 model. They don't
1842 have the materials for it. I am talking to one of them about
1843 their prototypes and she is really happy that they are making
1844 it as she understand the problem better and how it actually
1845 will function. TEAM B, they have gone from 3 concepts to 2.
1846 They slept on it and chose the final concept this morning.
1847 Their concepts are inspired by the muscle fibres, vertical
1848 space, plants that are hanging down. TEAM C is practicing
1849 their presentations. Facilitators + lecturers are making award
1850 show. Everybody is really into it. All the students are work-
1851 ing so focused to make their final concepts for tomorrow. They
1852 are not that desperate as I thought they would have been. TEAM
1853 B, I have encouraged them to make a visual map of their pro-
1854 cess. We are discussing how their process has been. It is in-
1855 teresting to hear how they each interpretate the same process
1856 and what actually happen. TEAM D, they are talking and making
1857 drawings on how the harrow point will go through the soil.
1858 TEAM A I help them make their prototypes done. They have made
1859 a deadline at 14.00 so they can doe stop motion film. 15.45
1860 doing the stop motion pictures. 16.00 TEAM B makes a check out
1861 and divides the work out. Are still missing to do their proto-
1862 types.

Field note, Grundtvigsvej 25, 2000 Frederiksberg [3] **,**
Friday 30th August 2013

1863 It is the last day for both evaluation and work. The students
1864 enter and they are busy. Everybody needs to work on their con-
1865 cepts and write up the reports + they need to clean up. I talk
1866 to team C about their trip to DTU. "It was like the first time
1867 our idea met reality". They have been on innovatoriet to build
1868 their final concept and this has again challenged what it

1869 could do and what it could not do. TEAM D, one of the members
1870 has worked all night and it is a little frustrated for the
1871 others. There is big difference in the level of ambitions.
1872 They are done with concept and are working on their final
1873 presentation. TEAM A, they are making report and final proto-
1874 type + they have made 4 films. It is their challenge to com-
1875 municate their concepts, which is large in scale than a harrow
1876 point. TEAM B, are also making report and concept. I doubt
1877 they are in control of their presentation. There is a lot of
1878 pressure compared to yesterday. TEAM A, one of them are trying
1879 prototype in 1:1, but it is not working because of the materi-
1880 als. TEAM C, under a lot of pressure. They did not know that
1881 they had to leave here at 11.00 they are so focused. TEAM A:
1882 "I am stressed now", she is sitting and writing up the report.
1883 TEAM D, are still doing presentation. It is the 3rd time they
1884 are doing it. They are also doing the enactive workshop exer-
1885 cises. They are trying out the balance between confidences and
1886 provoking. We arrive at Company Y and the different groups are
1887 getting ready. There is chaos and turbulence, but people are
1888 excited and energized. Some are still practicing presentations
1889 and working with until time runs out. The different companies,
1890 instructors, lecturers etc. are here. I feel nervous myself
1891 and feel warm. I am nervous on behalf of them and I am hoping
1892 the best for them. At 13.00 there is an introduction from An-
1893 nette. Company respondent Y is also there and she is putting a
1894 little pressure on the groups and talks about how she is al-
1895 ready getting funding for the idea. Annette talks about the
1896 journey and gives an overview of the three weeks, course con-
1897 tent, pep talk and comments and talk with the dean at KU. She
1898 goes through the team, the process. The students smile and it
1899 is boosting their confidence. First the CFR presents and the
1900 it is TEAM D and TEAM C. They present the initial problem by
1901 Company X divided into wearing, changing, functional los and
1902 material waste. They present an additional problem that they
1903 found and that was sale. They came up with that. There exist a
1904 harrow point in china that is working better. They present
1905 process — ideas — lots of posits. Fixed in the beginning. Got
1906 inspired by the wisdoms of nature. Narrowed them down. Came to
1907 the problem statement. Nature: both radical and unreal. Some
1908 realistic. The one they got most inspired by is the sea urchin
1909 for technicalities. Stay sharpness of teeth, layers of sharp
1910 teeth. They also talk about the healthy harrow. They are talk-
1911 ing about soft vs. hard to remain sharp and a layer wears of.
1912 This is a direct link to the sea urchin where they transferred

1913 its function to a harrow that could release carbon when being
1914 weared. They goes on to marketing which is the new thing that
1915 they hope will change their minds. The person from the company
1916 gives them feedback. "Wow —thank you". He is blown away and
1917 thinks that they are sharp with problems. "I got a question
1918 regarding marketing, and know I understand why". He is very
1919 impressed "we would never have gone that way. It is definitely
1920 out of the box. I will bring it back home and talk to the
1921 sales people". "Well have can I move forward from here?". "It
1922 is so far out. This is two steps further than we would go with
1923 fertilization the soil. Talking about steel in the soil". One
1924 in the audience asks how much it will affect the soil? "There
1925 is missing carbon in the soil, so it will an education and way
1926 of thinking. Research needs to be done. Soft material, but we
1927 need to figure it out". The person from the company says, "The
1928 whole marketing changes the thinking it is important as it has
1929 two purposes. It is like a trend". It is now time for TEAM C
1930 to do their presentation. They start with the case: redesign
1931 the harrow point and then what they call our real problem: to
1932 give inspiration to the company. They show they process the
1933 double diamond. They go through the methods. Morphology. De-
1934 veloped 100 ideas combined to 3. The early concepts. Boris,
1935 drill + loosen the soil. Joakimi, cooling + grooves. Pascale:
1936 clicking concept. They did objective weigting. Pascale scored
1937 the highest butt still had low marks so they improved them.
1938 They then got to their final concept K1. It has 3 different
1939 features. Tip: soil digging bugs, reduce friction, reduce
1940 wear. Rat teeth — soft + hard material. Keep sharp. Release
1941 tubes, scale: sand fish = flexible + improve flow. Concept:
1942 loosen soil, efficiency and not destroyed by rooks. "It is re-
1943 markable". It is a concept that can be taken apart. I am
1944 thinking that you have to let your self be divergent. TEAM C
1945 kept on working on the start idea and followed the process,
1946 where TEAM D just dropped everything and started from there. I
1947 guess it is the same problem with companies if you follow
1948 coopers model. The company person starts the feedback "really
1949 good concept. Going out of the box, using materials in a new
1950 way. Before you had the same ideas as us, but now they are
1951 new. So radical that we need new marketing. Too radical for me
1952 right now. He keeps on talking about the marketing issue. "I
1953 like to test it. I would love to work with you again. It is
1954 out of the box". Now it is time for the Company Y groups to
1955 present. TEAM B (Beeta) goes first. They start to present
1956 their process as an adventure. The case: company vs. differ-

ent. The company Y locationn: unique, different people, work better, lifestyle, efficiency etc. Problem: space, new space to be outside all year. Blur the boundaries. Deconstruct problem: light, heat, blur. Contradicting. Looked for inspiration in nature difficult to find as nature are to create boundaries. Different methods — brain walking. Inspiration from Balder and Morten. Morten: creative process, low arousal, mediation. Concept: playful and get inspiration. Backtracking ideas. Muscle — Self-reporting fibres, string walls, isolation. Penguin fur for air bubbles. Window plants — drive light from sun to roof. 1) Concept: strings — dense glass roof (coating, and reflection). They show the prototype: strings from sealing. 2) Prototype. Make in the structure, strings can be tied together or hang objects or furniture. Sun come from north so lights needs to come from above. It is time for feedback. Company respondent Y: "cool. What would the web be made of?" Student: "rubber, bouncy string, transparent. First floor glass. Strings need to be tough enough to hang things. It can be recycling materials". Company respondent Y: "what about the isolation?". Student: "we talked with bio expert and he told us that in DK most important to leave wind out and have light come in. strings in front is dense to keep warm in and wind out. Company respondent Y says that she loves the idea. It is very creative. You captured our company and you understand your client from our brief. Love the playfulness of it. I have an idea how well it will work. It would be a signature place. Where you get your picture taken. Company respondent Y,2: "no idea of expenses, but the strings can be cheap, but what about the window? But now I have a concept I can take to someone. One of the students says that they can collaborate with velux. Company respondent Y: it is colourful and playful, blurring boundaries between in and out, night and day — that is a catch phrase we can use. It is customizable and that is all about the experience economy. It is time for the next Company Y presentation TEAM A. They are giving out small samples of their concept. It is called POPOUT. They start with the case definition. Meeting room and shop, which they challenge. The company: dare, care and share, many different people. Their criteria: social, bring people together, unique, flexible, ownership, work and play. They go on with the process, techniques, and crazy eatable aquarium, function. They learned more things. They landed on flexibility. They show the video — showing the flexibility — deployable structures. Changing design for needs. It is inspired by the four bar mechanism, 3D

2001 model. POPOUT: flexible in future. They show another video:
2002 POPOUT junior + senior. Many sizes, different surfaces and
2003 sides to take the budget into account. They show another video
2004 with interaction and playfulness. It shows how it is modular,
2005 that you can have vegetation on surfaces. Go back to criteria.
2006 They feel they live dup to it. They can also make the popout
2007 themselves. It is time for feedback. Company respondent Y:
2008 "very cool. Really amazed, really good. You captured who we
2009 are, even in a different way. You took our values into ac-
2010 count. Really really like it. And it is mobile, potential mer-
2011 chandise; we can make money on it. We can sell it. W can make
2012 it and have it as a signature thing. Different surfaces, mate-
2013 rials, tables, chairs. Company respondent Y,2: I agree, poten-
2014 tial of popout, signature, really creative use of the space.
2015 What about the water in the winter? Company respondent Y: may-
2016 be we can put strings inside or use it as breakout rooms in-
2017 side.   You   guys   nailed   it   (to   both   groups).

Appendix 10 *Video recording transcript*

Video recording transcript, Friday 23th August 2013

1 TEAM D is presenting their idea generation. They used bio-
2 cards with e.g. the bumblebee and negative brainstorming. They
3 explain that bio-cards gave them very functional ideas where
4 negative brainstorming gave them more crazy ideas. They start-
5 ed clustered and reached a 100. First cluster reduce friction
6 and heat. They got a lot ideas in this with cooling system
7 which they prototyped. Worked with materials on the top as
8 coating. The other cluster was about to strengthen material in
9 order to make it more resistant, but it was difficult to pro-
10 totype. From negative brainstorming they got crazy ideas, and
11 we throw them away but then our facilitator suggested that we
12 used them again and they clustered them and got good ideas
13 from them. E.g. on extended the lifetime and reconstruct the
14 harrow and it gave us inspiration. The next cluster is benefit
15 environment and we worked with coating that can leave carbon
16 into the soil. So it will benefit the environment. We also had
17 a cluster to make it fun, like disco harrow or skiing. For
18 next week we will pretotyping and talk to some farmers and ac-
19 ademics to talk about how to make a healthy soil. Feedback by
20 Balder, good with feedback. He then goes on and says that in
21 the very beginning we talked about challenge the fact that
22 lies in the arrow itself and it sounds like all your theme are
23 centred around this. Is that a conscious decision or have you
24 ended up working with the harrow. A student says that the com-
25 pany put us in this direction. We feel that we have a broader
26 direction and add other things and how to change their minds
27 and what it can do. Balder: changing the blade themselves is
28 not that interesting and not where your skill is. Have you
29 considered in regards of changing. The students say that the
30 company did not wan that. They are looking into that. Balder,
31 I would recommend that you change the themes so only one theme
32 is about changing the blade. That is only one direction. You
33 can also look at business model. Joakim, nice presentation but
34 concerned about the problem — the heat and fiction — what is
35 the vision? What do you want achieve? What are you aiming at?
36 They can't really answer that and whom it is for. There is lot
37 of discussion. Joakim point out that they already did a prod-
38 uct that can last longer (8 years). Rikke says talks about it
39 has to something to do how farmers accept a problem. Joakim,

40 it seems to me that they know how to make it last longer so it
41 is more the behaviroal problem. Balder, the problem is that it
42 is identical with the other one so the farmers would not be-
43 lieve it. Rikke talks about butter on the bread vs. innova-
44 tion. Joakim, challenge that ideas that I has to last longer.
45 Maybe it can last for one day. How would that look like. The
46 students tries to defend it, they are a bit frustrated.
47 Joakim, tries to twist the problem. The facilitator tries to
48 defend them. The student's keeps on telling that they have
49 this big constraint of the company taking them in one direc-
50 tion that is about lifetime. Balder wants them to challenge
51 that direction and what the company wants. The students pre-
52 sent the carbon idea that is actually relating to the vision
53 "making the soil happy". This could change how the company
54 think. Joakim suggests that they should remove that constraint
55 lifetime. Rikke compliments their idea on coming up with how
56 the company can solve their own problem. Balder, figure out
57 what problem you are solving and who are you solving it for.
58 They get comments form students and one also mentions back
59 problems with changing it. After a break it is TEAM A's turn.
60 The students in TEAM B are talking about flexibility. They
61 will like to tell a story on how to find an outdoor home. They
62 are explaining themselves as homeless. She asks what is the
63 most important thing you would miss if you were homeless? They
64 went to find inspiration (shows a picture of Company Y Loca-
65 tion). We don't like to be inside they want to be outside and
66 create outdoor home and no one uses it. It started out with an
67 outdoor meeting space, but after our trip were saw that they
68 had made a lot of effort to make a lot of home feeling, but
69 that was not the case with the outdoor space. The problem is
70 right now: how to create an outdoor home inspired by nature.
71 How does animals create homes. They shows the context map and
72 it is narrowed down to brand, home, warmth, playful. We start-
73 ed to brainstorm on the outdoor home/home feeling. We looked
74 at ownership and hygge. Difficult with human related aspect,
75 so we looked at comfort. We would like to combine physical
76 thing and human related understanding of home and ask nature
77 how it makes home. They had the criteria: structure, shelter,
78 heat, light, flexibility, water and connectivity. It is mostly
79 physical things, but we want to combine with psychological
80 things. They show some of the inspiration, crab. They show
81 three prototypes. We looked at animals as constructors. Spider
82 web, beehive — look at the structure. They show a prototype
83 where they worked with heat, light and flexibility. The show

84 the third prototype that combined different elements with e.g.
 85 birds nest. It is some of the ideas based on many. It is still
 86 ideas and not one concept yet. Finish of by saying that we are
 87 still homeless but getting there. Feedback from Balder, good
 88 presentation and prototypes. They got better to direct the
 89 bio. One challenges is the purpose. "What is the purpose and
 90 whom it is for? Is it externals, users or?" Marjanne. The stu-
 91 dents say mostly the people working there. They say that there
 92 is a lot of traffic and people are coming in and out. So they
 93 want to create ownership and home feeling. They talk about the
 94 workshop and the discovery of the places not directed. Balder,
 95 when you decide whom it is for there will come new con-
 96 straints. Marjanne, the value of this place like the basics.
 97 You can give Company respondent Y a nice concept that can fo-
 98 cus on usages of the place. Connecting the uses to the place.
 99 What are the criteria for the users? Balder, beehive is inter-
100 esting metaphor, co-developing it together. Students, we find
101 it as a constraint that we have to find something in nature.
102 Joakim, you have been through a process with a made-up prob-
103 lem, we are not sure if there is actually a need for this out-
104 side home. When I see the solution I see one concept with dif-
105 ferent ideas. The whole daring part of company Y is missing. I
106 would like to see more of that. You have developed a lot.
107 Joakim, if you are changing the word comfortable with some-
108 thing else you might get different solutions. Marjanne, you
109 talk about you been working with a problem finding a problem,
110 what about the need. Student, they don't really need anything.
111 She wants everything and nothing. Company respondent Y just
112 wanted it to be used more. Marjanne "might be a good idea so
113 you can get away from running around the problem". Students
114 give feedback, one says that maybe atmosphere is not the
115 thing. Different space can give different things. One says,
116 have you thought about how the users can make a personal
117 space. TEAM A answers they have thought about if they could
118 build it and the users could play a role. One asks what about
119 funding? "They ask that Company respondent Y can sell it if it
120 is good so they decided to take that constraint away.

Appendix 11 *Pictures*

Brain storms
Team A

Association Game – day 2
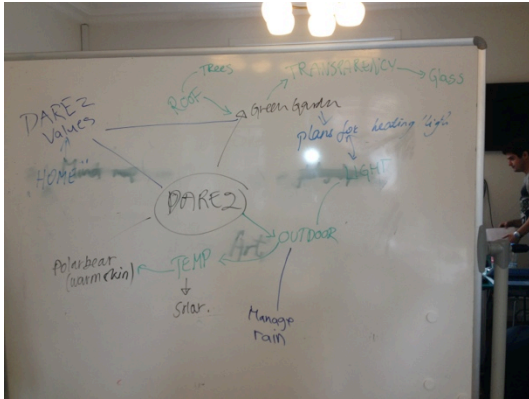
Constraints – day 5
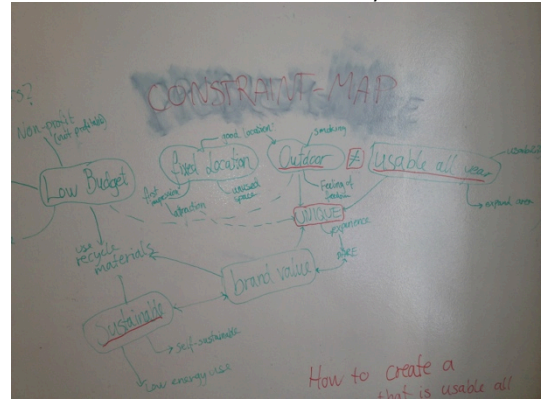
Brainstorm – day 5
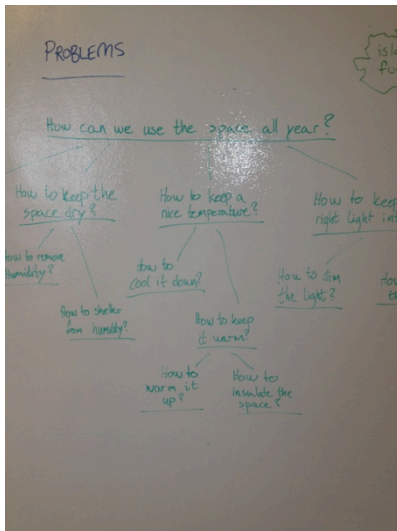
Brainstorm – day 6
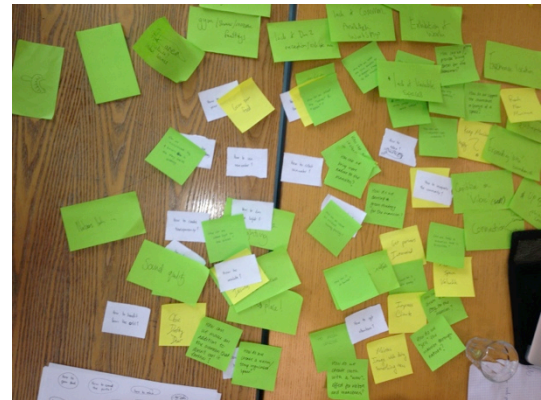
Brainstorm – day 7
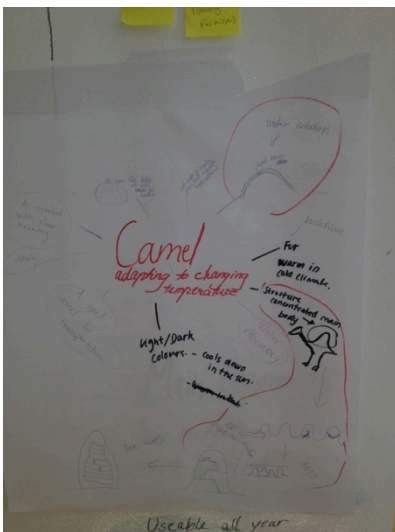
Brainstorm – day 7
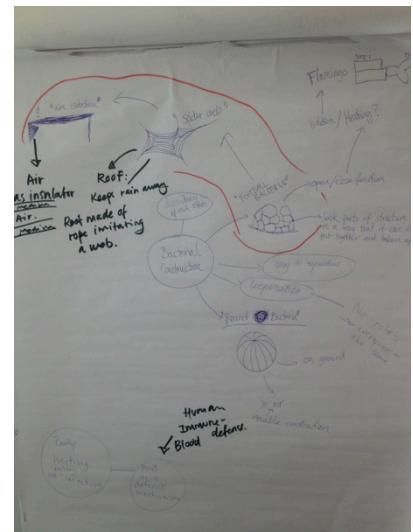
Brainstorm – day 7

Brainstorm – day 8

Brainstorm – day 8
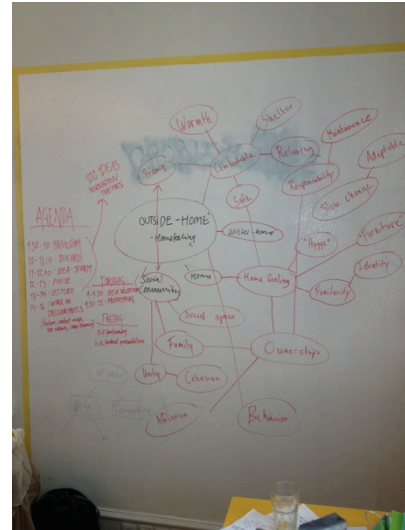
Brainstorm – day 8

Brainstorm – day 9

Brainstorm – day 9
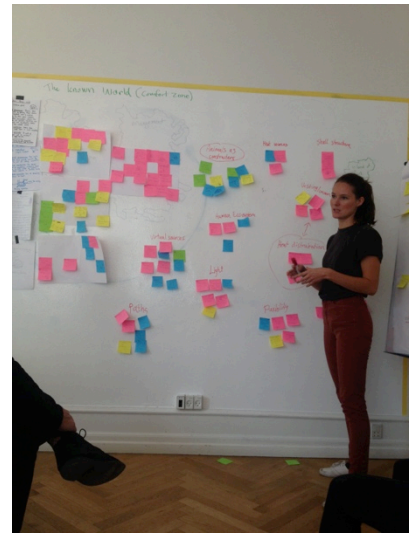
Brainstorm - day 11
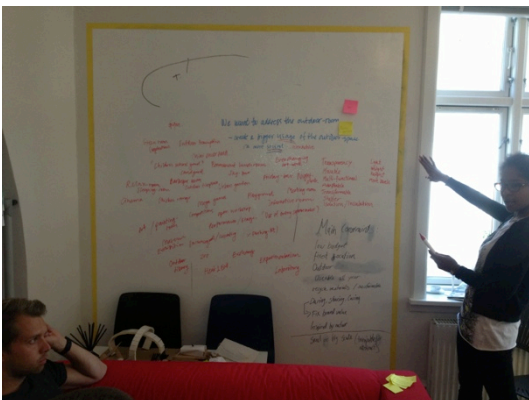
Brainstorm - day 13

Brain storms
Team B

Constraints – day 1
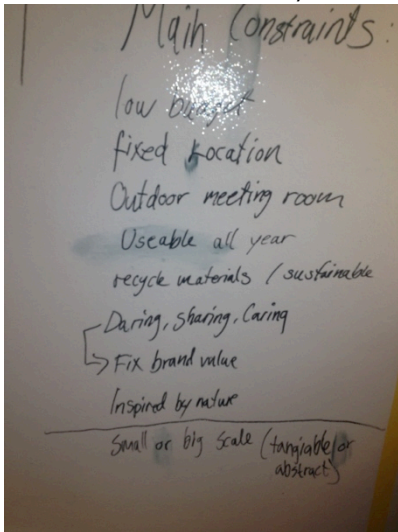
Idea parking lot – day 2
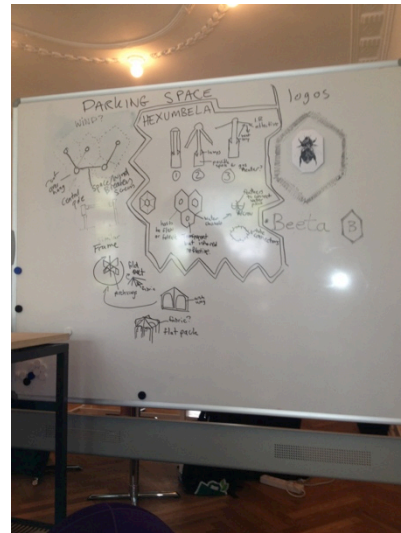
Brainwalking w. bio-cards – day 7

Brainwalk w. bio-cards – day 7
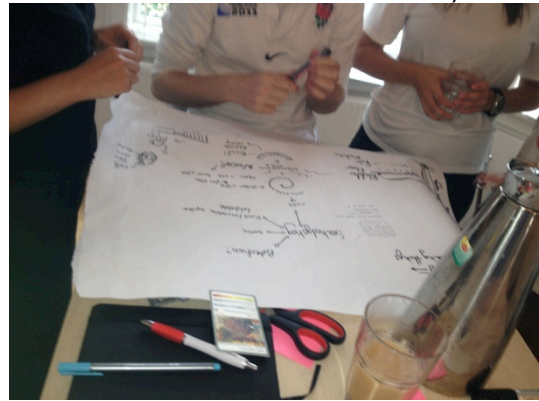
Brainwalk w. bio-cards – day 7

Brainwalk w. bio-cards – day 7

Brainwalk w. biocards – day 7
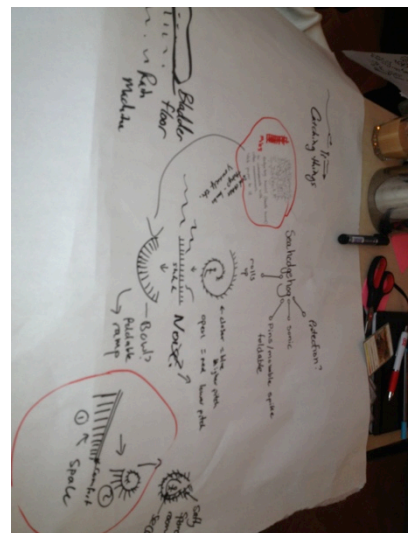
Brainstorm - day 6

Brainstorm w. bio-cards – day 9
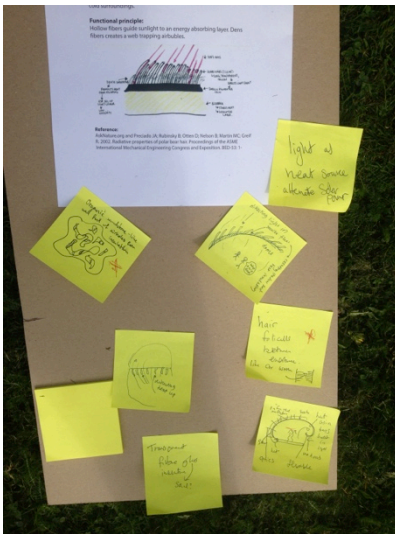
Brainstorm w. bio-cards - day 9
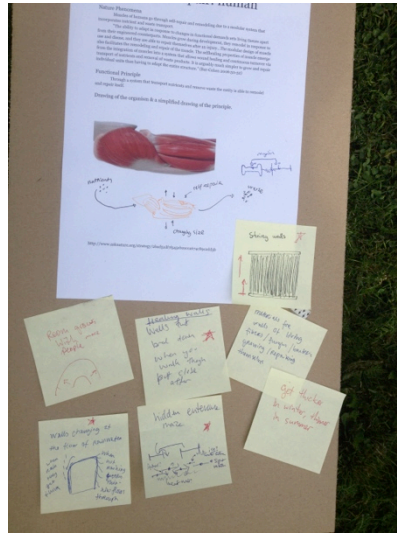
Brainstorm w. bio-cards - day 9

Brainstorm w. bio-cards - day 9
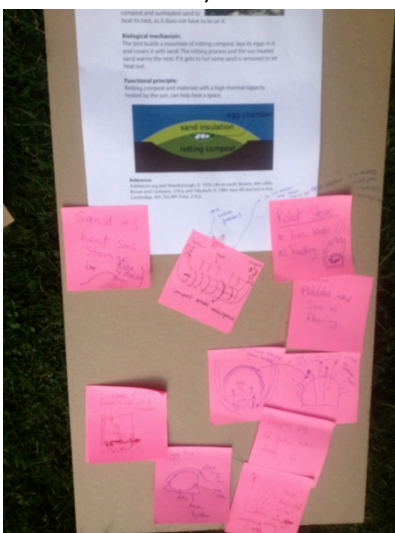
Brainstorm w. bio-cards - day 9
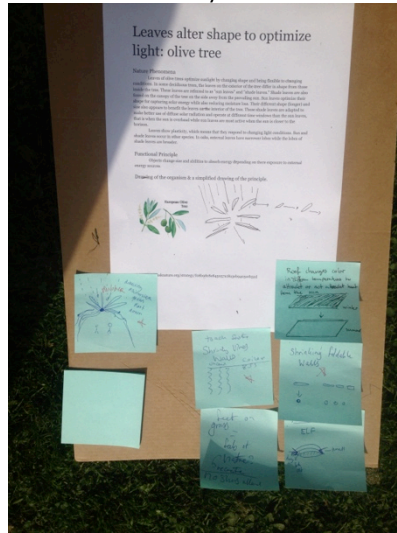
Brainstorm w. bio-cards - day 9

Brainstorm w. bio-cards - day 9

Brainstorm w. bio-cards - day 9
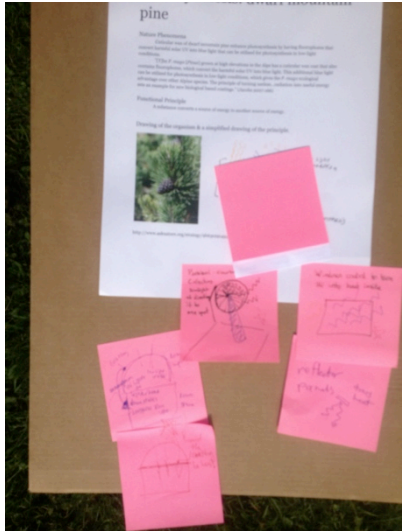
Brainstorm w. bio-cards - day 9
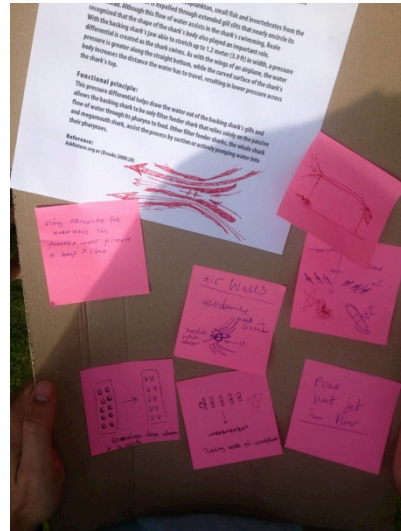
Brainstorm - day 10

Brain storms
Team C

Assumption Dumption – day 1
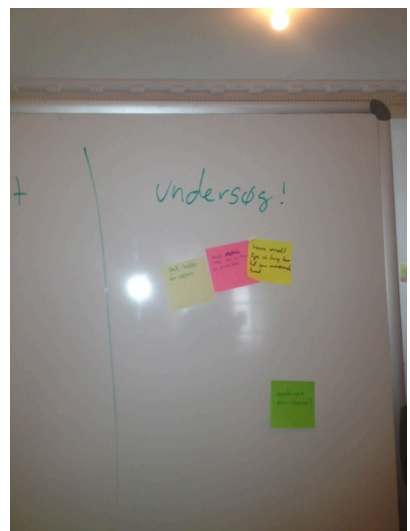
Assumption Dumption – day 1

Assumption Dumption – day 1

Brainwalking with bio-cards – day 7
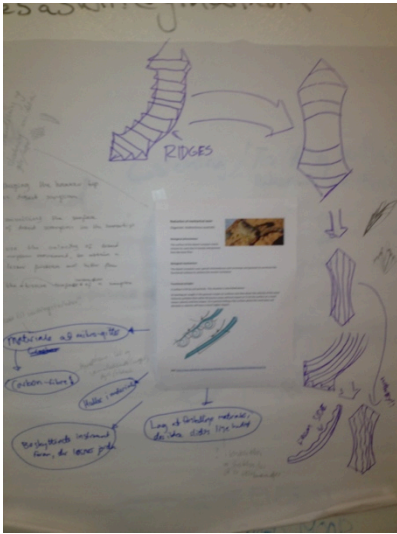
Brainwalking with bio-cards – day 7
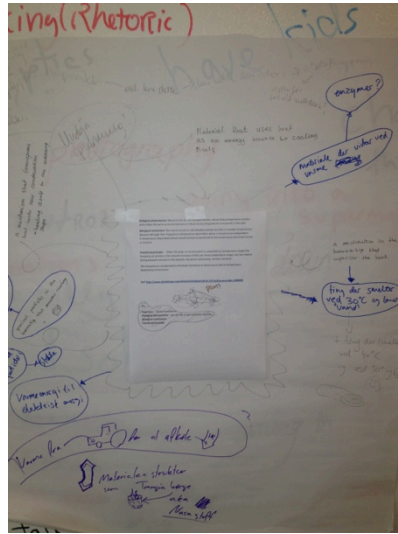
Brainwalking with bio-cards – day 7
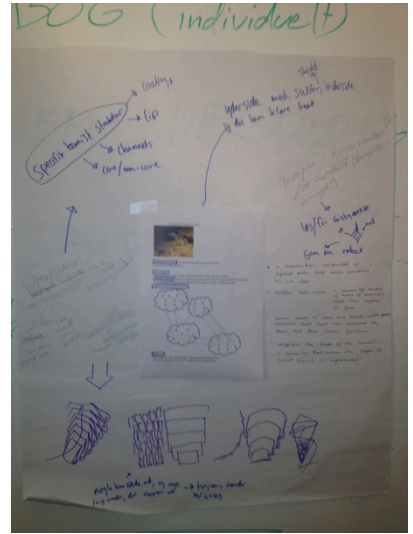
Brainwalk with bio-cards – day 7
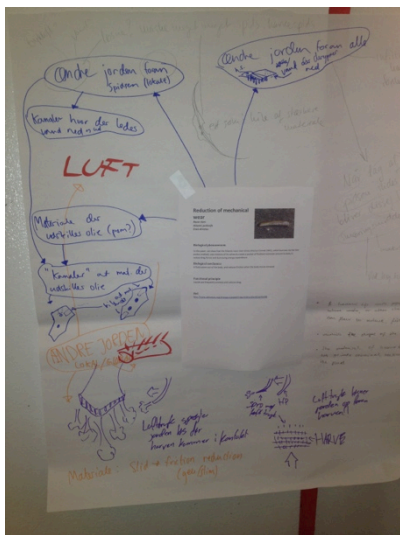
Brainstorm – day 7

Brain storms
Team D

Assumption Dumption – day 1
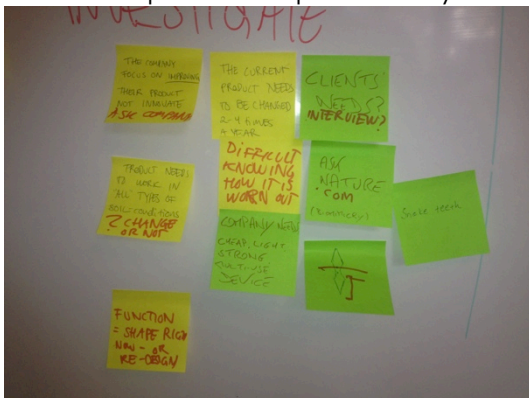
Assumption Dumption – day 1
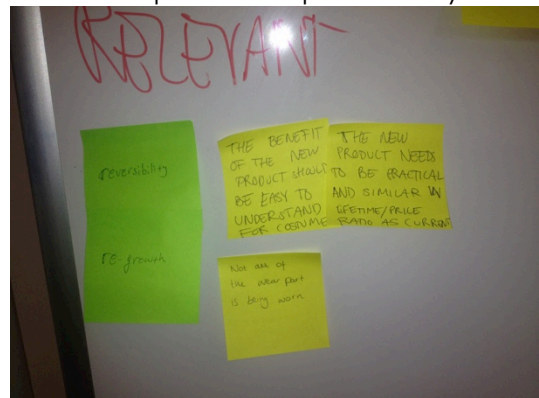
Assumption Dumption – day 1
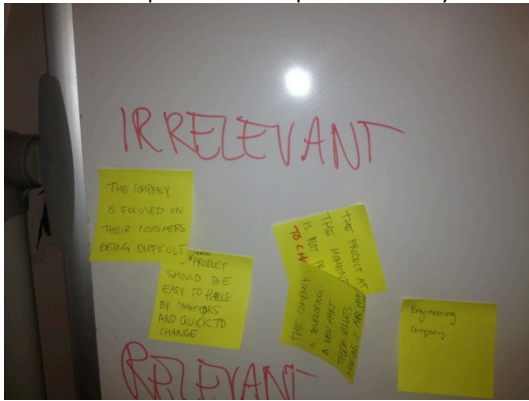
Association Game – day 2
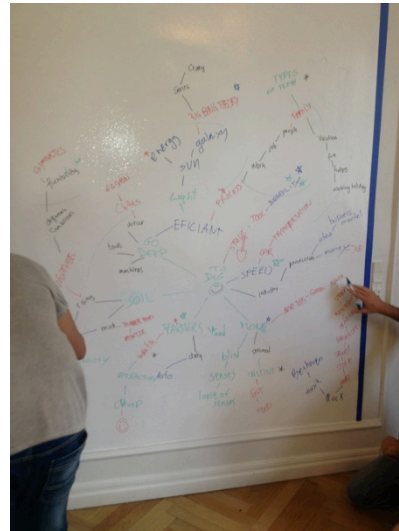
Idea – parking lot – day 2

Brainwalk bio-cards – day 7
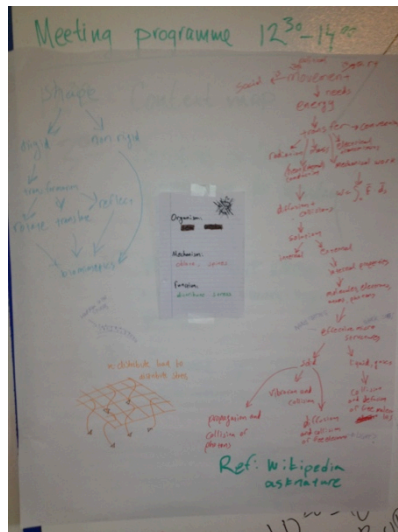
Brainstorm – day 7
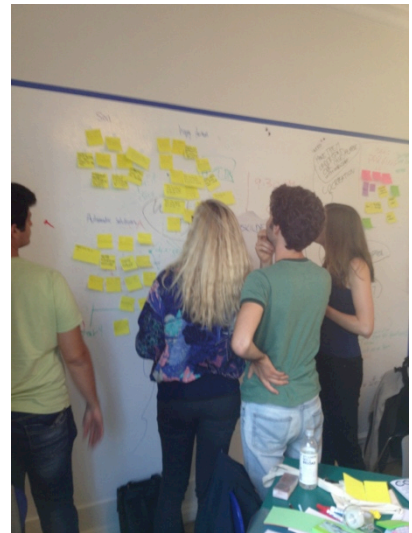
Evaluation exercises
Team A

Matrix – day 11

Matrix – day 12

Evaluation exercises
Team B

Evaluation criteria - day 11
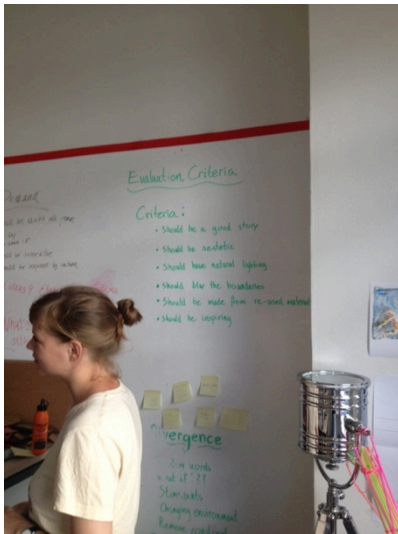
Matrix - day 11

Morphology - day 11

Objective weighting - day 12
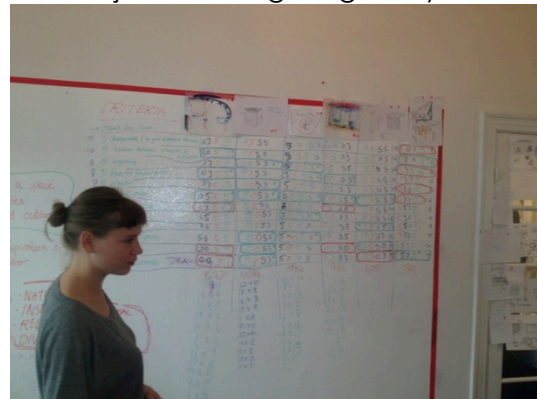
Evaluation exercises
Team C

Evaluating prototypes day – 8

Morphology – 9

Morphology day – 9

Evaluation day – 9

Objective weighting day – 8

Evaluation exercises
Team D

Evaluate ideas - day 9
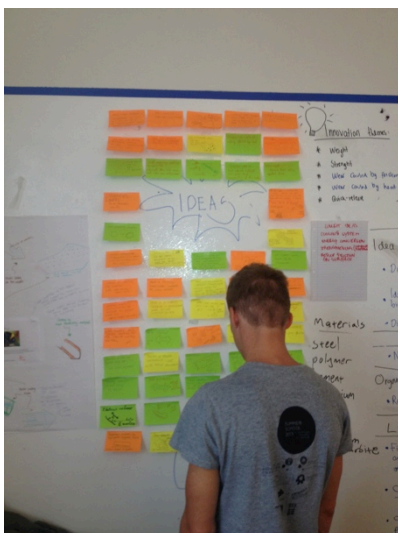
Evaluate ideas - day 9

Clustering ideas day – 10
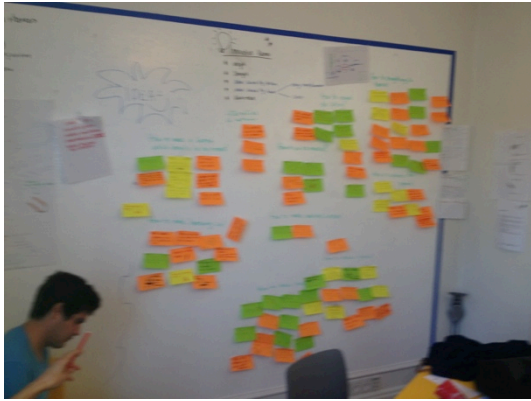
Evaluate - day 11
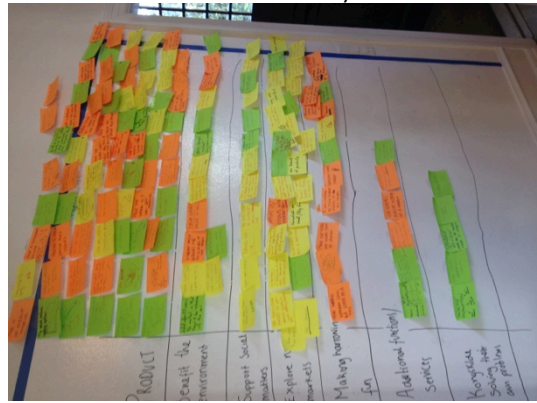
Prototypes
Team A

Prototypes day – 7

Prototypes day – 13

Prototypes day – 13

Prototypes day – 14

Prototypes
Team B

Prototypes - day 7
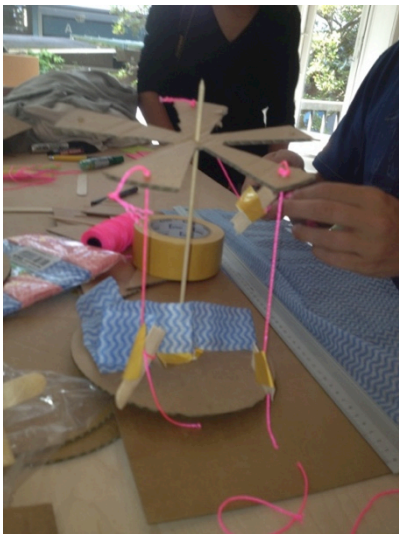
Prototypes - day 7

Prototypes - day 7
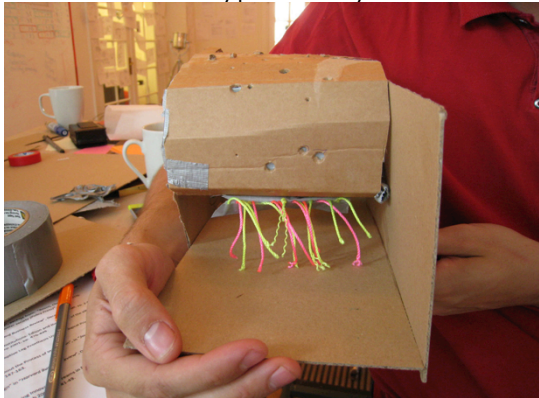
Prototypes - day 13
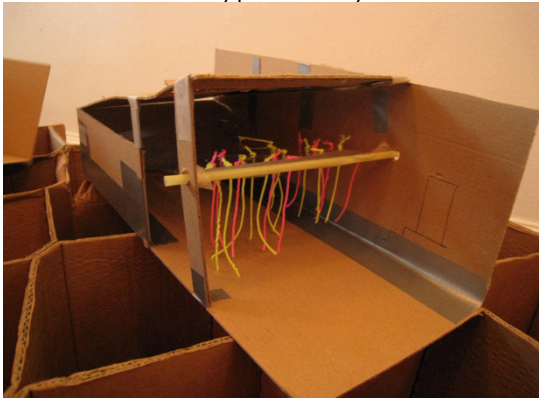
Prototypes - day 13

Prototypes - day 14

Prototypes - day 14

Prototypes
Team C

Prototypes day – 7

Prototypes day – 7

Prototypes day – 10

Prototypes day – 11

Prototypes day –11

Prototypes day – 11

Prototype day – 14

Prototypes
Team D

Prototypes day – 9

Prototypes day – 11
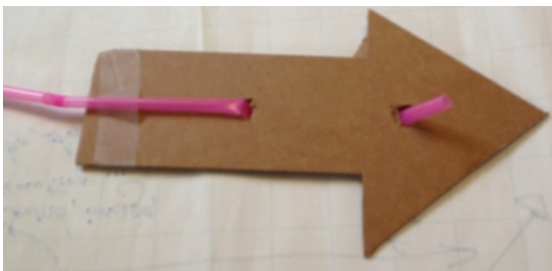
Prototypes day – 11

Prototypes day – 7
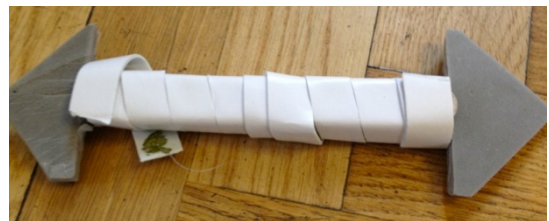
Prototypes day – 13

Prototypes day – 14

Prototypes day – 14
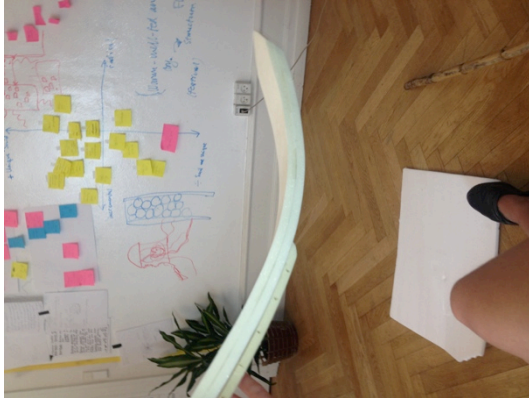
Agendas
Team A

Agenda – day 8
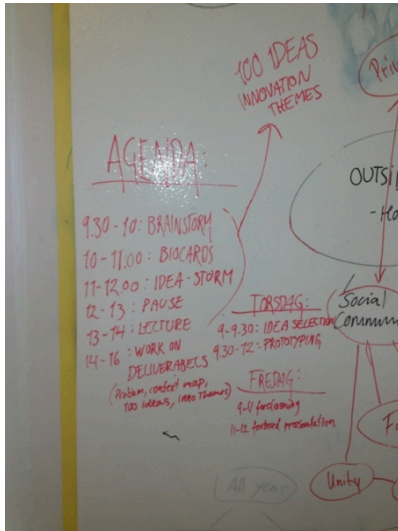
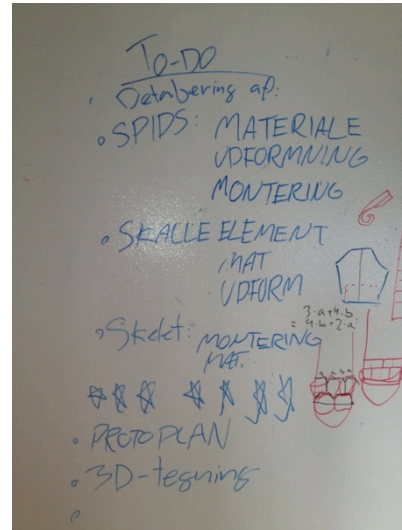
Agenda – day 14

Agendas
Team B

Agenda – day 8
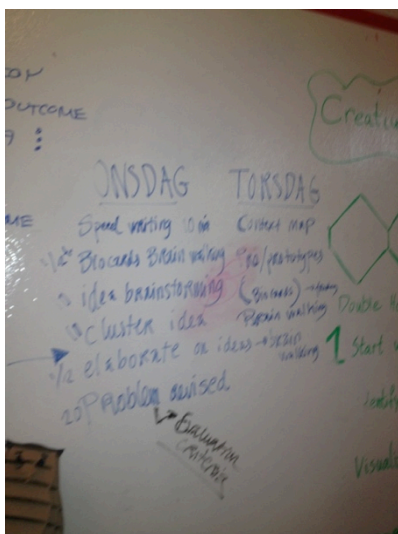
Agenda – day 14
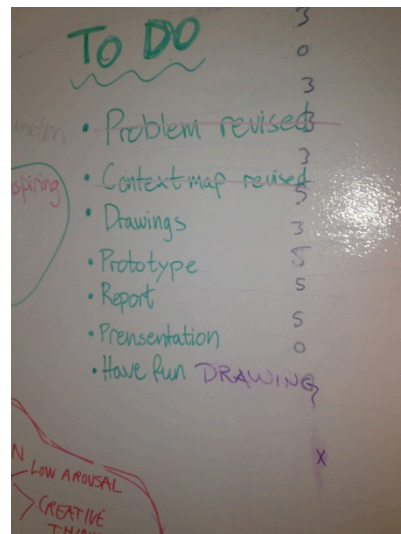
Agendas
Team C

Agenda – day 11
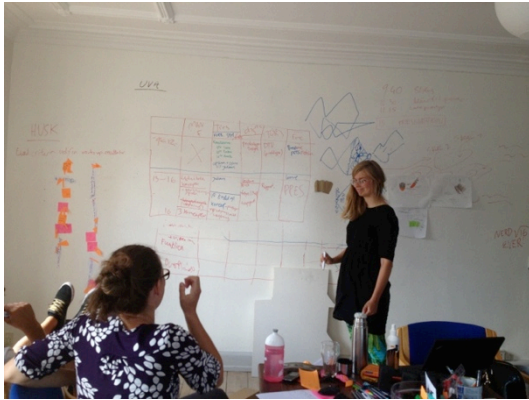
Agenda – day 13

Agendas
Team D

Agenda – day 5

Agenda – day 8

Agenda – day 11