

STORYBOARDING - FRAMING THE "FRAME" OF OPPORTUNITY

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ABSTRACT

The design brief is commonly a written description of a scope for a design problem that requires some kind of visual design. The exploration of opportunities before formulating the design brief results in framing and reframing the problem to create a common shared understanding of the problem. In this paper the applicability of Storyboard, the actual making of the storyboard, and its values to the front-front end of innovation is examined. Experiments has been performed in order to test three hypotheses and validate the results, in total four experiments was performed consisting of 25 teams developing 17 concepts. The three hypotheses focus, regarding type of innovation, scope and level of ambiguity, creates understanding of the values storyboarding can add with regards to framing opportunity for innovation in the front-front end of innovation. The result shows that storyboarding contribute to a narrow focus in creating the brief. Regarding the innovation type the hypothesis could not be confirmed, but storyboarding enables a reflection on both meaning and function. There were also some indications on ambiguity in the brief, but this hypothesis was not confirmed.

Keywords: storyboarding, framing, early design phases, innovation, human behaviour in design

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1 INTRODUCTION

When understanding an organization's needs and resources, the process of briefing, matching objectives and mission to future visions and goals, is central. The process involves problem formulation and is about identifying and communicating intangible needs and specifying the quantifiable. With a focus on creating innovative solutions, the use of creativity and design methods is advocated by researchers in the fields of business (Martin, 2009) and innovation (Utterback et al., 2006, Verganti, 2009). There is also significant evidence that the success of innovation depends on directions taken in the early phases of innovation processes, namely in what is called the "front end" (David et al., 1994, Cooper and Kleinschmidt, 1995, Khurana and Rosenthal, 1998, MacCormack et al., 2001, Verganti, 1999). The phase of the front end is of great importance for the success of innovation; it does not matter how well the process is managed or the design realized if they are based on a wrong assumption regarding the problem (Cooper, 1988). In an attempt to bring clarity to "the fuzzy front end", Koen et al. (2001) state that "the front end of innovation (FEI) appears to represent the greatest area of weakness in the innovation process". The decisions and actions needed to be taken in order to solve a problem are formalized in a brief (Blyth and Worthington, 2010).

Depending on the design challenge identified, the specifications of the design brief can differ in shape and format. In most cases, a design brief is a description of a project that requires some form of visual design (Phillips, 2004). The basic context of a design brief is the background of the problem including a wish or a demand, not a solution (Cross, 2000, 2008). The most common format is a written brief designed in a way that inspires and motivates the designer to create great work satisfying the client. What to include in the design brief will be decided based on the specific project needs (Best, 2006). The brief should be easy to read and track and is usually written in a narrative format or in a bullet-list format (Phillips, 2004). The outcome of creating a design brief is dependent on how the process of framing and reframing the area of interest is accomplished.

Cross (2000, 2008) argues that the design brief does not always get the attention and priority it needs and deserves in order to stimulate the team to carry out a successful project; if more focus can be put on developing the brief, the design process may have a better outcome.

There are also some general difficulties that can arise when framing and reframing a situation. Fixation of either the client's idea of the solution or the designer's initial idea can be a barrier to innovative ideas (Paton and Dorst, 2011). Some designers might experience fixation when looking at solutions and designs performed by other designers or be restrained by knowledge about the usage or properties regarding the problem or object in focus (Purcell and Gero, 1996). Approaching the situation using a mental model based on problem solving can restrain the designer at the front end of innovation processes (Paton and Dorst, 2011). However, there are psychologists arguing fixation as normative but malleable (Smith, 1995). In the design process, framing a problem can be seen as one of the key activities in the front-front end of innovation (Figure 1).

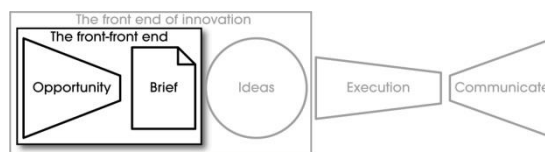


Figure 1, "positioning" the front-front end of innovation".

Despite this, there is not much research done in this area (Paton and Dorst, 2011), however there are some groundbreaking works from Lawson (1980, 2006), Schön (1983, 1991) and Cross (2007). The traditional way of briefing and framing a problem is done by formulating a written document (Blyth and Worthington, 2010, Cross, 2000, 2008, Phillips, 2004), and is supposed to be a creative step in the design process that allows for an innovative solution to be produced (Paton and Dorst, 2011).

The formal requirements of the design brief could be listed in many different ways, but how to actually perform in the pre-briefing phase is not explained to any greater extent.

The aim of briefing is to frame and reframe a problem so that an actual and shared view of the problem can be created. When a brief is formulated, framing describes the scope for a design problem and could be seen as a flexible constraint on the problem (Kolko, 2010). The phase of framing the problem is of great importance for the success of innovation, as mentioned before; it does not matter how well the process is managed or the design is realized if it is based on the wrong assumption regarding the

problem (Cooper, 1988). This means that it is crucial to understand and frame the problem in a way that the opportunities for innovation are in focus in order to know what to bring into the design space. Framing is executed in order to find the deeper reasons for the problem presented by the client, at the same time as it gives the designer a new perspective (Paton and Dorst, 2011). According to Schön (1983, 1991), a frame comprises the context of a problem together with a set of named categories, which creates certain conditions for the problem solving. These conditions are essential in order to be able to use technical expertise to solve the problem.

There is a difference between individual frames and frames made by teams. All members of a team create their own frame based on individual assumptions and knowledge. A frame made by a team needs a great deal of communication to be shared, and a frame that is not shared by the team often results in tensions and conflicting ideas, which counteracts consensus (Hey et al., 2007). The more aware a team or an individual is of their frames, the more opportunities for new ways of framing the problem arise. This also makes it possible to emphasize the values that are important for the problem and its solution and to leave out those values that are not important. An awareness of the personal frames often brings up the dilemmas in the situation and makes the team aware of them (Schön, 1983, 1991). Valkenburg and Dorst (1998) discuss the importance of frames in design teams; their research indicates that the development of frames is important.

In this research a visual narrative tool, storyboarding, is examined in order to support the framing of the situation of interest and the development of a design brief. Storyboarding is used to structure and visualize a story by using sketches and text. It was first used in the film industry to understand a complete story from abstract to a more specific view, but also to visualize expressions of an oral or verbal story. The main aspect of using storyboarding is to discover the visual appearance of a scene and to find out which questions have to be answered before realization of a concept. This way of mapping events into visual appearance is to simplify and create clarity to concepts (Wikström et al., 2011). Van der Lelie (2006) claims that storyboards can be used in the product design process to give a common visual language to concepts generated. According to the same author, storyboard could be used in the design process in the analysis phase, synthesis phase and simulation phase to develop, analyze or present different interactions within the situation. The scope and design of the storyboards can vary between very detailed to sketchy depending on different applications. This paper is a report on the third and last step in a bigger understanding of storyboarding. It concerns the applicability of storyboarding, the actual making of the storyboard, and its values to the front-front end of innovation by testing three hypotheses developed in earlier explorative studies of storyboarding in framing opportunities for innovation.

2 BACKGROUND

The first step was an explorative study with 54 teams performing a DoTank workshop (Figure 2) with the focus of developing ideas to communicative concepts to take in to the design process.

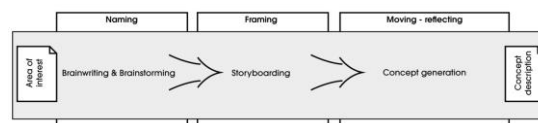


Figure 2. DoTank methodology, 90 minutes of idea development.

The reason for using storyboarding in the workshop was to tell stories in order to create understanding of the culture in where the situation actually appears and by that open up understanding on where to create meaning in the situation. We see storyboarding as a “shortcut” to create common understanding among diverse actors, yet emphasizing the diversity among the team of people.

The second step was set up as an experiment with students in their third to fifth year, the experiment was developed to test how storyboarding is different from the common way of describing a design brief, a written document, and to create a research agenda in order to explore this in depth.

The results gave insight about three differences that can be of importance for innovation management regarding the early phases of framing opportunity for innovation. These results have been formalized as three hypotheses and are summarized like this:

1. Type of innovation: A storyboard brief is focused on meaning while a written brief is focused on function.

2. Type of scope: A storyboard brief is narrow in its scope while a written brief is broad.

3. Level of ambiguity. Storyboard briefs are more ambiguous than written briefs.

With reference to these findings we argue that storyboarding seem to be more promising to support innovation projects that needs focusing in a narrower area, but in that area more open to freedom of interpretation and reframing of a problem at its roots. Written briefs seems more indicated for “problem solving” projects, in which projects are well defined, but have more room (innovation space) for the search of solution. This paper is focusing on testing the hypothesis in order to develop new understanding in framing and reframing the design brief.

3 METHODOLOGY

In order to test the hypotheses, an experiment was performed. The experiment was based on the theoretical foundation of design thinking, visual thinking, and narrative. The methodology (DoTank) supports idea development in brief workshops, 90 minutes, going from an “area of interest” to a “concept description”, where the concept highlights the framing of opportunities for innovation. The theory developed by Schön (1983, 1991) is used to structure the activities in a concrete way. The author is aware that this theory springs from how professionals individually think in action. In this context teams with both novices and professionals have participated.

To test the three hypotheses in specific, the experiment was designed and created to analyze how storyboarding can be used to formulate a brief in comparison with a written brief. In order to evaluate the difference between producing and using a storyboard and a written brief, a shift of teams took place at the beginning of the concept generation phase, but there was also an interest in following teams through the whole process of both producing and using storyboarding or written briefs. The experiment was divided into four separate experiments with a variation in design and the participants’ area of study. Each experiment consisted of three to six project teams with three to six students per team. The experiment had three phases, naming, framing, and moving-reflecting. The teams were assigned an area of interest as a starting point, after which they continued through the phases to conclude with a concept description.

Area of interest:

Many companies have recognized the potential of smart devices in vehicles to communicate with other smart devices. One of the companies wants you to develop this opportunity.

Every step in the experiment is supplemented by a visual tool shown in Figure 3. The first step for the teams to take is individual brainstorming (brainwriting) for about five minutes in order to clarify their individual beliefs and perceptions about the situation; this step is facilitated by a visual tool posing three questions about the future: Who or what affects the area? Is there any uncertainty in the field and in general? What are the current trends, generally and specifically? These questions are posed in order to open up the mind for the specific theme and create the first frame of the situation. Since this is done individually, everybody in the team can make their voice heard in the next step, which is information sharing using brainstorming.



Figure 3. The visual tools supporting the different steps in the methodology.

The brainstorming session starts by sharing the thoughts and beliefs about the future among the team members. They are encouraged to build on each other’s information and add new thoughts and information that comes to mind during the brainstorming. Towards the end of this step, which lasts for about 20 minutes, the team is asked to focus on one situation or issue that they find most intriguing or interesting to continue work on.

Moving on to the next step the teams are instructed to draw and tell a story about the situation they have focused on using a storyboard. Towards the end of this step the teams are again asked to focus on one specific part of the story from which to develop their concept.

In the last step (moving-reflecting) the teams are forced to create a concept out of the briefs. Depending on the setup of the experiment (there are two setups that are explained below), the time frame for this phase varies from 30 to 60 minutes. The challenge for the teams is to create a concept

and conditions for others to understand their concept. This phase also makes the concept concrete and helps moving the concepts forward.

3.1 Experiment 1

The participants in this experiment were students of Product Development in their third and fourth years. In Figure 4 the experiment is visualized with the specific phases and where in the experiment the shift of teams from producer of the brief to user of the brief took place. In this setup a change in teams was performed after the framing phase; this was to explore whether the interpretation of the brief was affected by the way it was developed.

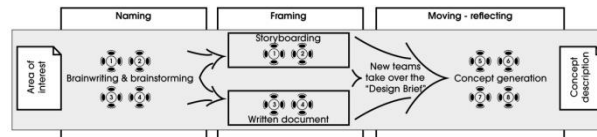


Figure 4. Design of Experiment 1 and 3.

3.2 Experiment 2

The participants in this experiment were students of Innovation Management in their second year and teachers of the subject, divided into three teams. This experiment was executed like Experiment 1, with the exception that each team completed all three phases (Figure 5). This implies that all teams were aware of the area of interest when developing the concept description. This also reduced the time of the moving-reflecting phase to 30 minutes; when shifting the teams before this phase, the time was 60 minutes.

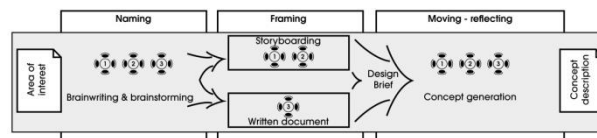


Figure 5. Design of Experiment 2 and 4.

3.3 Experiment 3

Experiment 3 was executed like Experiment 1. The participants were second-year Information Design students, divided into eight teams.

3.4 Experiment 4

Experiment 4 was executed in the same way as Experiment 2 but with six teams, three doing a storyboard and three producing a written document. This experiment was held at the National Taiwan University of Science and Technology in Taipei. The participants in this experiment were graphic design students and industrial design students. The reason for doing this fourth experiment in Taiwan was to give insights into the generalizability of the results in another culture and context.

4 RESULTS AND DISCUSSION

The four experiments resulted in 17 briefs, nine storyboard briefs and eight written briefs. The briefs were analyzed individually and compared with the hypotheses. The results are summarized, presented, and discussed in the following sections. Two examples are presented below in order to clearly describe the difference between storyboarding and written documents.

Example 3.4, written document

A written brief from Team 3.4 (Figure 6) in which they interpret the area of interest and develop a description, the situation is about lack of time in everyday life.

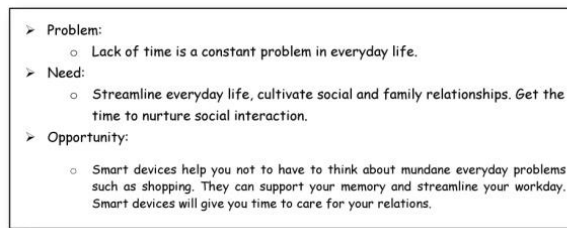


Figure 6. A written brief from one of the teams.

This brief has a clear topic, the issue of time in everyday life. There is no indication of function apart from using smart devices, which could be understood as some form of functionality, but we have not analyzed this as functionality as in the briefs presented in the storyboards. This is not explicit in the brief but referring to something out there to solve the problem addressed. The focus is broadly described and does not give any direction regarding the aim or value to create. The area of interest has even expanded from the original one. The brief has put the area of interest into a new area of interest, using smart devices in order to create some kind of value in a social and family relation. There is a clear shift of focus in this specific brief, something that opens up for interpreting smart devices in a whole new area. This means that the transportation company (defining the original area of interest) is focusing on an area outside transportation.

Example 4.5, storyboarding

The following is a storyboard example from Team 4.5 (Figure 7). The storyboard describes a “Smart Parking Team” addressing the problem of finding a parking place in the city.



Figure 7. A brief developed using storyboarding from one of the teams.

There is a clear meaning in this storyboard: creating value for the user with a smart and easy way to book a parking place in the city. However, there is also a clear function as well, using technology in the car to book, pay, and find your way to the reserved parking place. However, there are no clear technological descriptions of how this value should be achieved. It is also very clear that there is a narrow focus in the situation described; the area of interest was to explore the possibilities of using smart devices in vehicles. This storyboard focuses on one specific event, the parking of a car in a city. This is a really narrow area of interest and the framing of the situation is clear and convincing. Regarding the level of ambiguity there are some difficulties compared with the written briefs. The storyboard describes a clear value to achieve but is open for interpretation of how this value best can be obtained.

4.1 Hypothesis 1

– Type of innovation: A Storyboard brief is focused on meaning while a written brief is focused on function.

The results from the experiments with respect to Hypothesis 1 vary. One thing that is interesting in Table 1 is the fact that the storyboard briefs include both meaning and function in five out of nine briefs, but the written briefs all distinguish between meaning and function. It also shows that there is a

variation in focus (meaning or function) of the briefs regardless of whether they are done as storyboards or written documents.

Table 1. Results from the analysis, Y stands for yes (contains).

Type	Storyboard brief								Written brief								
	1.1	1.3	2.1	2.3	3.1	3.3	4.1	4.3	4.5	1.2	1.4	2.2	3.2	3.4	4.2	4.4	4.6
Meaning	Y		Y	Y		Y	Y	Y	Y	Y	Y			Y			
Function	Y	Y	Y		Y	Y		Y	Y			Y	Y		Y	Y	Y

A brief focused on meaning describes a situation and why the situation occurs. It often involves humans and puts the user in focus. A brief focused on function has a problem-solving approach and describes desired functions.

The written briefs are distinct in either meaning or function. In the storyboard briefs on the other hand, it has been difficult to decide whether some of them are directed towards meaning or function since they include both. Some of the teams using storyboards started by formulating a problem scenario, i.e. meaning, and continued by finding solutions to the problem, i.e. function, which was not supposed to be a part of the framing phase. The storyboard tool itself contains a number of empty boxes encouraging the users to describe a problem or a situation along a timeline. The given number of boxes might also create a wish to complete the storyboard and not leave any blanks. This facilitates expressing meaning by telling a story but also encourages the users to continue the story by presenting desired functions and sometimes even solutions.

Hypothesis 1 claims that a storyboarding brief describes why a problem occurs, but observations and analyses from the experiment showed a tendency when using storyboarding to describe what is happening. This indicates a gap between meaning, i.e. why a problem occurs, and function, how the problem can be solved. The gap could be expressed as a situation, i.e. what is happening when the problem occurs. It is, however, an interesting finding that storyboarding more often includes both meaning and function, which might affect the concept generation in the next phase, either positively or negatively depending on the type of project. When a storyboard brief includes a great deal of text, it also seems to become more directed at function since the text might impose restrictions on the components that should be included in the concept. The result from the experiment shows that Hypothesis 1 cannot be confirmed. Hence, there is no direct evidence that shows a clear difference between storyboarding briefs and written briefs regarding the focus of the hypothesis. The indication from previous studies was that there was a difference between storyboarding briefs and written briefs regarding the focus of meaning or function. What was found in this study was that there is a difference but not the expected one; the difference lies in the fact that storyboarding involves a focus on both meaning and function while written briefs focus on either meaning or function. This finding is interesting since it forces the team to focus on meaning when using storyboarding in the pre-brief activities. The other interesting thing here is that written briefs tend to focus on either meaning or function.

4.2 Hypothesis 2

– Type of scope: A Storyboard brief is narrow in its scope while a written brief is broad.

The result from the experiments with respect to Hypothesis 2 is clear. As shown in Table 2 there is only one brief (3.2) deviating from the hypothesis. The reason for this could be found in an early fixation in the team on one specific part of the area of interest.

Table 2.

Type	Storyboard brief								Written brief								
	1.1	1.3	2.1	2.3	3.1	3.3	4.1	4.3	4.5	1.2	1.4	2.2	3.2	3.4	4.2	4.4	4.6
Narrow	Y	Y	Y	Y	Y	Y	Y	Y	Y				Y				
Broad										Y	Y	Y		Y	Y	Y	Y

The results are also evaluated and visualized in Figures 9 and 10 below. The grey circle visualizes the given area of interest, the black ring visualizes the brief and the black dot shows the position of the concept description in relation to the area of interest and the brief. The size and position of the black ring shows the scope of the brief in relation to the area of interest.

In Figure 8, explaining the scope of the storyboarding briefs, it is clear that storyboarding is narrow and within the scope of the area of interest. Briefs 1.1 and 3.3 resulted in concept descriptions outside

the boundaries of both the area of interest and the brief. In brief 4.1 the scope has deviated somewhat from the area of interest and the concept description is on the border of the area of interest.



Figure 8. Visualization of the Storyboard briefs' scope in relation to the "area of interest".

In Figure 9 explaining the scope of the written briefs, briefs 1.2, 2.2, and 3.4 are broader than the area of interest but lack important information, which allows for a solution outside the boundaries of the area of interest. Brief 1.4 is broad in its scope because it includes the original boundaries but has also additional information that opens up for solutions outside the area of interest. Brief 3.2 deviates from the hypothesis since it is very narrow in its scope.

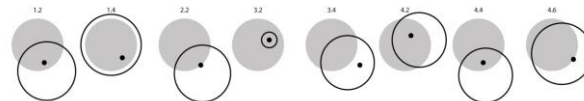


Figure 9. Visualization of the written briefs' scope in relation to the "area of interest".

A narrow brief is more delimited and specifies more details than the area of interest. A broad brief opens up for more opportunities and enables solutions outside the area of interest. The narrowness of storyboarding supports management in providing a strategic direction for the team; this can also remove hidden fixations from the teams. When a broad brief is presented to a team there is always a risk that the team will end up with old solutions following fixations from past experience and not recognized as fixations. This could consequently be avoided by providing a narrow brief with a clear direction for the team.

All storyboarding briefs are narrow in their scope while all written briefs except for one are broad. This specific narrow written brief (3.2) differs from the others by being extremely narrow. Observations during the experiments indicate that one participant in this team had a fixation that restrained the rest of the team. Fixation of an initial solution can be a barrier to innovative ideas, which can make the scope narrow. Regardless of the context and type of brief, a fixation can occur. Despite this deviation, Hypothesis 2 is considered confirmed.

The analysis showed that a written brief does not always describe a scenario. Instead, the written briefs focus on describing important events briefly in a short context. This allows for a broader scope of the brief since the root cause of the problem is undefined. A storyboarding brief is generally narrower than a written brief since the pictures in the storyboard usually describe one or more situations. A reason why storyboarding briefs are narrower could also be the complexity of describing a generic category with pictures only. In the experiment, a vehicle was pictured in the storyboards as a car or a truck, which made the brief narrower. In written text on the other hand, it is possible to choose generic categories to broaden the brief.

4.3 Hypothesis 3

– Level of ambiguity. The Storyboard briefs are more ambiguous than the written briefs. The timeline and sketches in the storyboard create openness for interpretation while the text forces you to be more precise in your explanation, leading to less space for interpretation. When analyzing the concept description in relation to the area of interest and the briefs, it was found that two of the concepts were outside the boundaries for both the challenge and the brief. Those briefs were storyboards, narrow in their scope and within the boundaries of the area of interest. This indicates that storyboarding briefs might have a higher level of ambiguity since a picture gives opportunity for divergent interpretations, while a written brief has a lower level of ambiguity since a text is traditionally used in more concrete and precise contexts. Besides, the participants might not be used to interpreting sketches in a context like this, which could make it difficult to identify important details, particularly when there are several sketches to interpret at the same time. All details might be there in the sketches but do not attract the participants since not enough weight is put on the importance of the details. The time limit set at the experiment might affect the ability to understand the context of the sketches. A written brief gives a better overview of the important details since it allows the designer to check that the concept description is consistent with the brief.

Another indication of the ambiguity of the storyboarding brief is the results presented in Section 4.1 regarding meaning and function since the storyboard shows both, and a more ambiguous interpretation could be possible. However, this hypothesis needs more research in order to be understood. And, as formulated here it is not proven since it was more difficult to find ambiguity in these experiments than it was in previous studies. However, the hypothesis needs to be reformulated, perhaps with a focus more on ill-defined problems instead of ambiguity.

4.4 General observations

There was a great variation in the design of the briefs, which indicated that some of the teams lacked knowledge of how to formulate a brief. Observations during the experiment showed that some teams spent time discussing what a brief is and how to create it. Hence, some of the final briefs did not include the basic context of a design brief, which should incorporate problem background and wishes or demands. The written instructions could have described the basic context of a brief and further clarified the focus on formulating a problem and not giving solutions. This might have affected the result of the experiment and should be considered when evaluating the credibility of the experiment.

Some of the written briefs lacked important information from the area of interest, which let the brief fall outside its mission. Based on observations, one reason could be a fixation on one part of the area of interest. Another reason could be that only one writer formulated the written brief, which may have discouraged the other participants to contribute. The storyboards on the other hand seemed to encourage all team members to contribute and take part in formulating the brief.

To be able to analyze the outcome and establish a result, we as observers had to set frames for how to evaluate the outcome. Since the two concepts in Hypothesis 1, meaning and function, are not opposites of each other, it was difficult to set clear frames for the evaluation. The outcome clearly showed that a brief could include both meaning and function, which made it difficult to analyze the outcome based on the given hypothesis. Hypothesis 2 on the other hand concerned scope, where narrow and broad are opposites of each other. The area of interest was a reference for the evaluation and made it easier to decide the scope of the brief. In Hypothesis 3 the results appeared in the analysis of the other hypotheses; these findings would have been hard to confirm without the other parts and might be more complex than those of the other hypotheses.

It should be mentioned that Experiments 2 and 4 were evaluated in the same way as Experiments 1 and 3, even though there was a difference in the design of the experiments. To get even more reliable results, it might be necessary to perform additional experiments, also formulated differently. It could be interesting to investigate how different teams would interpret the same brief.

6 SUMMARY & CONCLUSIONS

This experiment involved two different methods to frame a problem, storyboarding brief and written brief. The methods were compared in an experiment where three hypotheses were tested with two different setups, one with teams doing the whole workshop and one with a change of teams after the naming phase in order to evaluate the interpretation of the briefs. Hypothesis 1, regarding meaning and function, is not confirmed since some of the briefs included both meaning and function and no distinct result could be determined. It is an interesting finding, however, that storyboarding briefs often include both meaning, i.e. why a problem occurs, and function, i.e. how the problem can be solved. This could be expressed as a situation, i.e. what is happening when the problem occurs. This allows for different possibilities and outcomes of the next phases in the design process. This actually enables reflection on both meaning and function when framing a situation using storyboarding. Hypothesis 2, regarding narrow and broad, is considered confirmed since all storyboarding briefs were narrow in their scope while all the written briefs except for one were broad. Storyboarding briefs are in general narrower than written briefs since the sketches in storyboarding usually describe situations, while the focus of a written brief is on describing important events briefly in a short context. This allows for a broader scope since the root cause of the problem is undefined. Hypothesis 3, regarding the ambiguity of the storyboard, needs more research, but some indications of the ambiguous level of storyboards are presented, however not enough to make a statement about the hypothesis.

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