Developing a Serious Game to Teach Collaborative Decision Making

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Abstract

Collaborative decision making is a complex skill that is often used to solve problems in organizations. An advantage above individual decision making is that a group has more knowledge and expertise available. However collaborative decision making has many risks, like groupthink, social loafing, Furthermore, groups do not always use all available information. The use of a highly structured process can prevent these common dysfunctions within groups.

A serious game can be used as a training tool, because games are found helpful in teaching complex skills. Another advantage is that learners experience more pleasure during learning. In this research, a decision-making board game was developed where players work on a decision task in four rounds: brainstorm, argumentation, evaluation and the final decision. During these rounds, the players discover issues, gather positions, give arguments for and against the positions and finally agree on a solution.

In the experiment 10 groups worked on a decision task. They either worked on the task with the game or were in the control group without the game. Afterwards they filled in questionnaires and participated in an interview.

The questionnaire showed that the groups in the Game conditions scored higher on positive affect. In the interviews, it was found that the structure from the argumentation model was helpful in the decision-making process in both conditions. The participants were positive on the process and satisfied with the final decision.

This research has shown the importance of a structured decision-making process. A serious game is found to be a good method to teach a structured decision-making process. The advantage of a game is that the learner will experience more pleasure while learning.

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1. Introduction

Decision making is happening often in daily life, and moreover, a great part of these decisions is made in organisations. Decision making is the act of making choices between different alternatives. Much time is spent on discussing what the best option is to solve certain issues. It is argued that decision making is one of the most important activity of all management activities (Lunenburg, 2011). But in fact, decision making happens in every level of an organisation. Every employee is spending time on making decisions. Furthermore, decisions are not only made by individuals, decisions are made more and more in collaboration,

In group decision making individual differences are combined to come to a shared decision. Many models have been developed to analyse the process of group decision making (Kerr & Tindale, 2004). In group decision making, opposite to individual decision making, multiple persons have control to influence the choices (Keeney, 2009). Group members with different information and preferences on an issue will try to reach agreement together (Levine, 2018) This paper focusses on decision making with a goal of reaching consensus, a group working together to generate and evaluate alternatives to come to an agreement on solving the problem.

Group decision making has benefits above individual decision making. The group has more knowledge and expertise available, a greater number of alternatives can be examined, the final decision is understood and accepted by the group members and there is more commitment by the members to make the final decision work (Lunenburg, 2011). However, group decision-making has potential pitfalls if practiced incorrectly. Behavioural factors can influence group decision making negatively. Group members might feel social pressure to conform, the decision can be dominated by a minority and it usually takes longer to come to the final solution (Lunenburg, 2011). Further, groups sometimes have a false shared reality. Because not all individual knowledge is shared, and groups often only discuss their common knowledge. This means they do not use all available information in their consensus, this can lead to a wrong agreement on the final decision (Levine, 2018). Thus, exchange of information is a key element in group decision making. The group should enable a more complete consideration of preferences and alternatives then an individual would. However this happens often very poorly, also leading to poor decisions (Dennis, 1996)

The decisions made by groups are usually very complex. Multiple objectives are involved and they have complicated interrelationships between alternatives, their consequences and uncertainties. This complexity makes it hard to come to an agreement.

However, it is important that these decisions are made well, since the outcomes can have a major influence (Keeney, 2009). Therefore, it is important that the process goes structured. This can be done by using a rational decision-making procedure, based on certain steps that should be followed. It starts with the problem discovery, then alternatives are developed, consequences are specified and in the end the decision is made (Grünig & Kühn, 2005).

Since group decision making is an important method in organisations to make important choices, it is important that employees know how to make these decisions. It is needed to train employees and teach them a structured process of problem solving. The processes that take place during decision making have a big influence on the outcomes. Depending on the context, this will lead to a good or a bad performance (Kerr & Tindale, 2004). In this report, an idea of a training method will be examined that can assist in teaching decision making in a collaborative setting. This will be done in the form of a serious game, because games are found to be a good method of teaching complex systems (Castronova & Knowles, 2015). The game will assist groups by simulating a structured process of decision making, to teach the skill within its context.

Next, background information will be given on serious games, collaborative learning and how to use serious games. Then the decision-making process will be explained into more detail. Afterwards, the design rationale will be introduced, a method to capture the decision process. In this research, a decision-making board game will be developed to examine if a game can assist in the learning of structured group decision-making process.

2. Serious games

Learning something new is not always a pleasant activity. It takes a lot of time and the learner may experience many setbacks. This makes the process hard and not motivating. Therefore, there must be thought of ways to make learning more fun, for example by using games. Gaming may seem contradictory to learning, since games are by most people seen as voluntary and pleasant activities. However, learning and gaming are combined in serious games. A game can be used to teach skills or knowledge, if pedagogical elements are integrated (Kiili, 2005). If this is implemented correctly, the players may experience flow during their learning process. Flow (Csikszentmihalyi, 1990) is a mental state where someone gets the feeling to lose track of time and space because one is completely engaged in an activity. This makes the learning process interesting for the learner and provides a high level

of motivation. One important condition to reach this state of flow is having some challenges in the game. The learning should not be effortless (Kiili, 2005).

2.1 Definitions

Serious games are a special type of games. Salen & Zimmerman (2003) introduced a conceptual framework on (digital) games, consisting of three schemas to look at games: *Rules*, *Play* and *Culture*. *Rules* are the game design schemas that focus on logical and mathematical structures of a game. *Play* covers the experience and social setting of the game. *Culture* looks at the larger cultural context in which games are designed, the beliefs and norms that are represented in the game. This framework demonstrates the complexity of games. Similarly, opinions differ on what a serious game exactly is. Serious games can vary a lot depending on the context and who uses it (Breuer & Bente, 2010). Most authors agree that serious gaming is the use of games with a purpose that is not only entertainment (Breuer & Bente, 2010; Susi, Johannesson, & Backlund, 2007). Thus, the difference to a normal game is the purpose, to teach some kind of knowledge or skills (Susi et al., 2007).

In Zyda (2005) a serious games is mentioned as: "a mental contest, played with a computer in accordance with specific rules, that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication". However, the focus, like in most literature on serious gaming, is on the use of digital games. Although digital serious games are ubiquitous available nowadays, other forms of serious games exist as well. Due to the popularity of digital serious games, board games are often under-appreciated (Castronova & Knowles, 2015). Whereas board games have the advantage that they are much easier to understand, since the player can immediately oversee the whole board. This makes the transparency higher making it easier to understand complex systems. An report on the development process of a serious game, showed that the most successful approaches were the techniques with card games and tabletop games (Kultima, Niemelä, Paavilainen, & Saarenpää, 2008).

2.2 Collaborative learning

Collaborative learning is based on the belief that learning takes place in a social setting, and not only on individual level. Knowledge is constructed during the interaction with other people. Learning will take place by doing collaborative tasks like discussing, clarifying and summarizing. These activities lead to a better understanding of the content (Orvis & Lassiter,

2009). Previous research has shown that collaborative learning also assists in building confidence to overcome learning barriers (Avery et al., 2010).

Working in a group has benefits, because some activities can only take place in collaboration. For example, coming to a joint understanding with group members or negotiation can only be learnt in a social setting. Additionally, some activities are related to a good learning process, and are likely to occur in a collaborative setting (Barron, 2009). Group members share knowledge, observe peers, use argumentation, provide critique and explain each other things. Therefore, working in a group usually leads to better learning outcomes.

On the other hand, working in a group brings the risk of pitfalls caused by collaboration. Groupthink, social loafing, production blocking and fear of evaluation are taking place too often in groups and may have dangerous consequences (Kultima et al., 2008; Mahyar et al., 2017). However, this does not mean that this will always happen and groups are not helpful at all. Groups are capable of achieving many goals that individuals would not accomplish. Although group learning may sometimes be underappreciated, it is needed to see its importance. Collaboration is used widely as a human resource. Moreover, it can learn individuals skills, people would not learn outside of a group (Barron, 2009).

2.3 Implementation of serious games

Learning within a context has the advantage to add more meaning to the process of acquiring new knowledge or skills (Susi et al., 2007). Serious games can make it possible to simulate the context of the skill that is learned. Likewise, the use of serious gaming has been successful to assist in authentic learning (Di Loreto, Mora, & Divitini, 2013). Key elements in authentic learning are that the context reflects the real-life situation, authentic activities can take place and multiple roles and perspectives are provided. This contributes to exploring, discussing and constructing concepts and relations on the subject.

Ideally, learning is completely integrated in the game (Breuer & Bente, 2010). Only then, the learner will experience learning as part of the entertainment in the game. Serious games are a good option for skills training. If the skill in the game is identical to the real-world situation, the game is usually more successful in teaching the skill (Linehan, Lawson, Doughty, & Kirman, 2009). To make sure the real situation is captured in the game, the situation must first be evaluated to generate an environment that accurately models the challenges related to the skill. This should also be reflected in the dynamic system of the game and the consequences of the behaviour.

Furthermore it seems that serious games are especially valuable in the learning of complex situations (Castronova & Knowles, 2015). Many aspects can be captured in a game, by modelling the complete context. For example, it is found that games are successful for creativity, which is a complex process with different phases (Kultima et al., 2008). A creative process is an important part of decision making, while it is needed to generate multiple alternatives before moving to a solution (Grünig & Kühn, 2005). Creativity cannot take place on demand, designers need a relaxed and playful atmosphere that creates a successful creative process. However, for enhancing the creativity it is also needed to have constraints that manage this chaos of free ideas (Kultima et al., 2008). The game design can facilitate a good balance between thinking freely and having a structured process. The features of games are a good base to guide people to a good solution.

3. Decision making

3.1 Collaborative Decision making

One area where the use of serious gaming could be helpful is group decision making. Decision making is a complicated process, and gets even more complex when this takes place in a group. It is hard to learn a complex skill without context. Implementing this in a game can be useful for the learning process. In decision making, different actions can be used for; based on intuition, using a routine recourse of procedures form the past, unquestioned adopting suggestions from experts, choosing at random, or a systematic rational thought where relevant information is used (Grünig & Kühn, 2005). The focus in this research is on a rational decision-making process.

In collaborative decision making, multiple individuals are involved (Lunenburg, 2011). Being involved in decision making, gives someone the influence to change certain issues (Keeney, 2009). During the process, the views of all actors will be different. They all have different opinions regarding the goals and what the problem actually is. Further, the behaviour of individuals changes in a group. For example their motivation and responsibility will be different (Grünig & Kühn, 2005). Since none of the actors has a complete control on what will happen, they should all focus on the process (Bennett & Howard, 1996). This may be a reason to lose focus on the subject that is being discussed.

The main goals of group decisions are to achieve consensus and pool expertise and knowledge by all group members. Additionally, the group should have a corrective function if

people have biased perspectives. Expected is that group discussions lead to better decisions since more people are involved. However, the group discussion itself rarely goes systematic and balanced. Therefore the discussion can be biased by its process (Stasser & Titus, 1985). It is found that the collective group performance usually is not equal to the sum of their individual performance (Latané, Williams, & Harkins, 1979).

In a group discussion, the members are occupied with three different actions: Information recall, information exchange and information processing. All of these activities have to do with some kind of bias. And even more important, because of mental processing capacity, each individual can only focus on one of the activities at a time (Dennis, 2017). Another often occurring problem is that groups tend to focus more on their shared knowledge, and less on unshared knowledge. Information that is known to one individual is not always used in the decision making process (Kerr & Tindale, 2004). Groups have even more risks that should be prevented. Phenomena, like social loafing and groupthink are frequently happening in groups and can lead to losses in the group process. A cure can be possibly be found in the channelling of social forces, where individual responsibility will be intensified instead of diffused (Latané et al., 1979).

Many different methods have been developed to avoid dysfunction in group processes and to assist groups in making a good decision. One method often used in decision making is brainstorming. This technique is helpful in the generation of many alternative solutions to a problem. Important in brainstorming is that everyone is encouraged to think of solutions without the fear of evaluating. Evaluation only comes after the generation of many alternatives to enhance creativity during the process (Lunenburg, 2011).

3.2 Argumentation-based decisions

In the process of decision making, argumentation can play a big role. Argumentation is based on proposing assertions, discussing them, and resolving them in different issues with diverging opinions. The purpose of argumentation, other than to proof, is to persuade (Bench-Capon & Dunne, 2007). Arguments are used to support, explain or attack statements, like decisions or opinions. These arguments provide reasons that are useful in negotiations. Adding the underlying reasons in arguments gives explanations and justifications. This has the advantage to be more informative and open to discussion and criticism (Ferretti, Tamargo, García, Errecalde, & Simari, 2017). Many games are based on argumentation theory as well (Dung, 1995). In games players tend to look for possible payoffs in all the alternatives.

Therefore, argumentation is needed for negotiation in the game. Consequently, combining the decision-making process with serious gaming may be a good fit.

According to Noble & Rittel (1988) in a design process the understanding of the reasoning and its problems can be seen as a process of argumentation. This assists in not overlooking certain aspects in the problem and makes sure connections to other problems are found. Also following an argumentation-based decision making, and recording this, makes the process mare transparent. The arguments used tell something about the relations of different alternatives. Keeping track of this explains why certain decisions are made (Lee, 1997).

3.3 Design rationale

One area that has to do with decision making is design in product development. It is important that decisions are taken early on, this will improve the process and makes sure a good product will be delivered (Poorkiany, Johansson, & Elgh, 2016). Usually in design decisions, certain needed information is only available to few people. While it is impossible for people to remember everything, information is mainly retrieved from external sources, like documents, databases, drawings and models. Moreover, colleagues are used as external sources the most. However, if information from these resources cannot be retrieved, this information goes away. Leading to gaps in the available information. Accordingly, this information should be captured to retain. This can be done in a design rationale (Bracewell, Wallace, Moss, & Knott, 2009).

The need to document these ideas is high, since information should not get lost. The design rationale can assist in retrieving this information to improve collaboration, reuse, maintenance, learning and documentation (Lee, 1997). The design rationale is the documentation of the decisions made during a design process (Burge & Brown, 1998). Also, justification, alternatives considered, the argumentation that led to the decision and trade-offs, can be included. Making use of design rationale capturing can help in tracking all issues, decisions and alternatives explored. This makes the structure of the reasoning process more clear and can be supportive in future decision making (Lee, 1997). Rationale capturing tools are a new form of the design rationale, that support in integrating the design rationale into the development process (Burge, 2008). These tools for the design rationale are expected to be effective in design collaboration (Poorkiany et al., 2016).

Design rationales can vary a lot in their type. One form of the design rationale is based on argumentation, this primarily contains the arguments that have led to the decision (Burge & Brown, 1998). The Issue-based information System (IBIS) is a well-known argumentation-

based model used for capturing the design rationale (Kunz & Rittel, 1970). This model, based on *Issues, Positions* and *Arguments,* can be used to come to a solution in a design process. *Issues* are the design questions that need to be discussed or deliberated in the design process. *Positions* are ways or options to resolve the problems, thus alternatives. *Arguments* are statements that support or object the positions (Zhang, Luo, Li, & Buis, 2013).

Argumentation-based design rationales lay out the structure of arguments, this is done in a graphical format, see Figure 1. Nodes represent components and links represent relationships between these components. For example, an argument supports or objects a position.

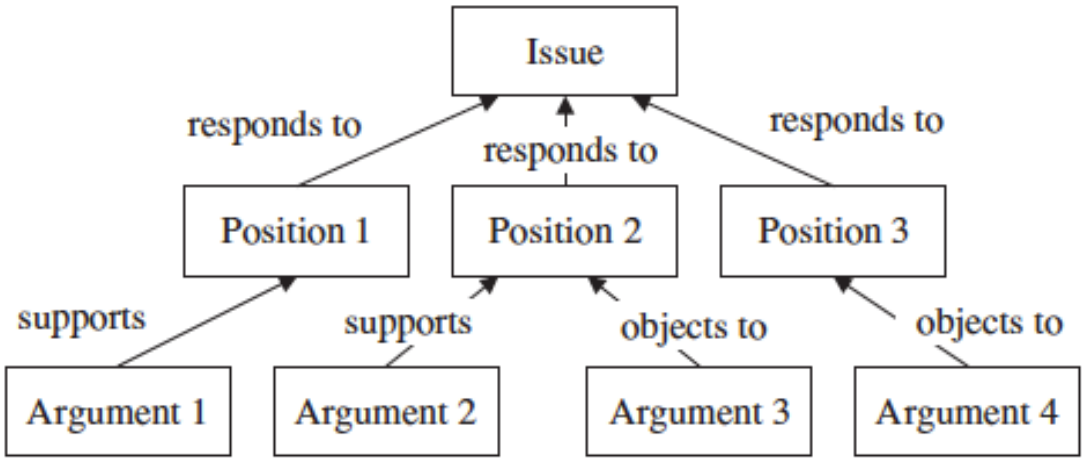

Figure 1. The relationship of issue, position and argument in the IBIS model.

This form of the design rationale helps to maintain consistency in decision making, keep track of decision, and communicate the reasoning process (Regli, Hu, Atwood, & Sun, 2000). It is found that highly structured design rationales support in easier retrieval of this information (Poorkiany et al., 2016).

4. Research question

The process of decision making is complex, and it is hard to learn this from theory only. It is needed for the learner to understand the process, the structure and the argumentation. A game could be used to simulate the conditions of a group decision-making process, this will help to teach a complex skill within its context. Structuring the process will make it more clear and transparent. Therefore, it gets easier to understand what is going on. This is valuable for the actors to know why a certain decision is made. It will help them understand the process of

decision-making, and teach them how to behave in a process of group decision-making. By using a serious game, the learning will be more fun and cost less effort.

The purpose of this research is to develop and test a serious game, that will assist in the learning of group decision making. It will be examined whether a serious game is a suitable learning method for this process. This will contribute to the answering of the research question. That is*, how can a game contribute to training of collaborative decision-making?* This will focus on the structure in a decision-making process, using an argumentation-model. The results can possibly give more information on processes related to training of collaborative decision-making in this specific context.

A board game will be developed, mostly based on theory from the IBIS argumentation-model. This game should give a framework for a structured discussion and help the users to have a rational process based on argumentation, to come to a decision. The game will be tested to see how the learners interact with it and their experience will be evaluated. A control group will do the same task without the game. In the analysis, attention will we paid to the influence of the game in comparison to the control group. The focus will be on the structure during the process and the equality of the input of the different actors. It will be examined if the game can assist in having a better decision-making process that will generate more ideas and, in the end, bring a better solution to the problem.

5. Game development

For the development of the serious game, a brainstorm session was planned to think out the rules and materials. The game was initially based on the idea that a decision-making process usually goes in multiple rounds using a system of rules (Grünig & Kühn, 2005). It starts with the problem discovery, then options are developed and evaluated, then consequences of these options are specified, and last, the decision is made. This was first put into five rounds: problem discovery, brainstorm, arguing of positions, evaluating positions and giving arguments, and the final decision. These rounds combined with the structure of the IBIS argumentation-model (Kunz & Rittel, 1970) lead to a framework of a structured decision process. The components of the argumentation-model, issues, positions and arguments, can be played in the right time and placed in this framework.

The early phases of design, conceptualization and ideation, are critical in a design process. Games are helpful in creating an atmosphere were ideas can flow freely, which enhances the creativity. On the other hand, to have a constructive brainstorm session,

constraints are needed. Furthermore, the process of creating ideas is quite structured, a systematic approach in the game can help to facilitate and guide this process (Kultima et al., 2008). Moreover, a well-structured design rationale helps to clarify the whole structure of the reasoning, which will support in a decision making process (Lee, 1997). Likewise, the argumentation will be tracked in the game to make to process more transparent and comprehensible.

The collaboration during the decision-making process should have an important role in the game giving every player the opportunity to have an equal amount of input. Also, the variety of opinions of the different actors should be integrated in the game. Therefore, players were giving turns during the game. During someone's turn, this player can add their own thoughts to the playing field. Giving each player space to have an individual input.

Later on, some changes were made to the original rounds. The first two phases were combined in the game resulting into four rounds:

1) Problem discovery + brainstorm: Defining the problem and start thinking of alternatives. In this round, players should use their creativity and imagination. No judgements on the ideas should be given. The goal is to generate as many ideas as possible.

2) Argumentation: Give arguments to support or object positions. For every argument knowledge or evidence should be provided.

3) Evaluation: Evaluate the different possibilities and discuss thoughts with the group.

4) Decision: Make a final decision that everyone agrees with.

The concepts of the argumentation-model were translated onto cards, see Figure 2. Each concept was given a different symbol to make it directly clear what it meant, as well to increase the likability of the game. On the front of the cards the symbol and card name is clearly visible. On the backside both are still present, but there is room to write some keywords on the concept you play.

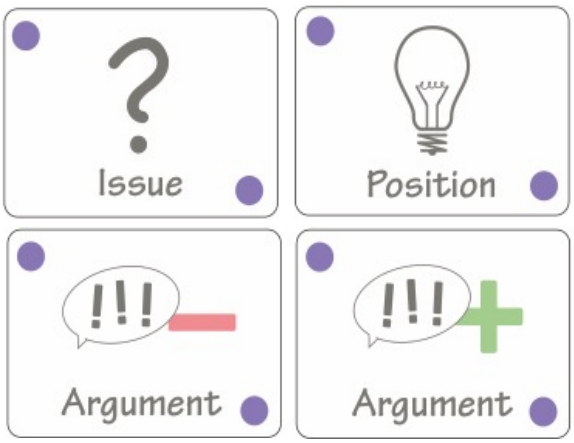

Figure 2. Issue, Position and Argument Cards.

Figure 3. Excellent, Good and Pass Cards.

Next, other cards were added, see Figure 3; A Pass-card, when players are out of ideas and do not want to use their turn. And two evaluation-cards: one Good and one Excellent, to grade the positions played during the game. This helps the player to give an individual grade on the options before discussing them.

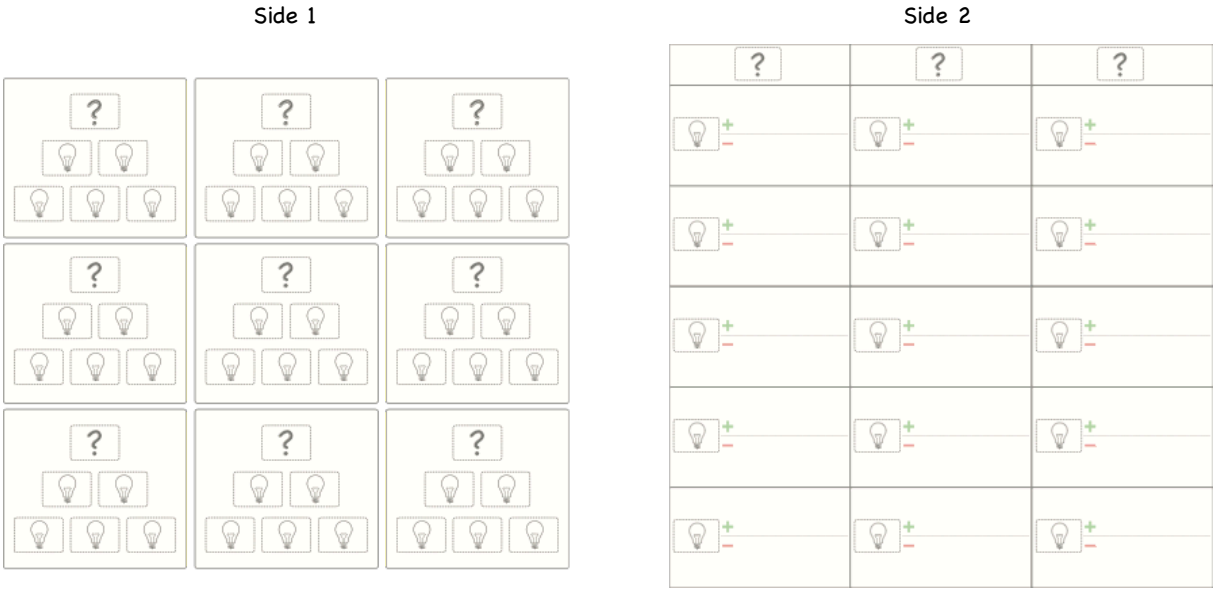

Figure 4. Game Board.

The cards can be placed on the game board during the game. The board has two sides, see Figure 4. Side one is used during the *Problem Discovery and Brainstorm*. On this board are nine blocks to place Issue-cards on. For every issue, five Positions-cards can be placed underneath it. When the groups have evaluated the most important issues from this side of the board and continue to the next round, these issues can be placed on side two of the board. On side two a maximum of three issues can be placed, together with the positions from the first rounds. Arguments for and against can be placed with the positions.

In the final round, the decision is made. Each group member has a piece of a puzzle with one of the symbols. When the group has decided on the final decision and every group member agrees, they can play their puzzle piece. The game is over when they all played their piece and the puzzle is complete, see Figure 5.

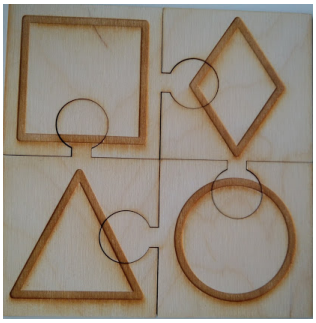

Figure 5. Completed puzzle for the final decision.

To conclude, a game was designed taking into account different important aspects of the decisions-making process. Further, it was meant to create a context that resembles a real situation to have the best learning experience. And even more important to create a pleasant environment, where players have fun while they learn.

6. Pilot study

A pilot study on the game was conducted with three persons. These participants received the instructions and had to play the full game. The researcher was the group leader and answered questions or gave hints during the game. Afterwards they had to fill in the questionnaires. After they finished the task and the questionnaires, there was an open discussion on the game, the instructions and the process. They were explicitly asked to give feedback and point out points of improvements or things that were unclear. Also, the researcher did observe the process to find any points that needed improvement.

The pilot gave a good preview on how the game would be experienced by the users. It also resulted in some important points that were changed in the study. Overall, the participants liked the game. They indicated that they thought the game would be helpful and that it would help to get everyone involved in the discussion. The overview on the feedback from the pilot can be found in Appendix 2.

The most important change gathered from the pilot study was on the instructions. The participants mentioned that they did not fully understand the rules of the game when they started. They suggested to add a visual instruction and give an example beforehand. From observations during the pilot study it became clear that in every round the main goals should be stressed. E.g. in the first round repeat that issues and positions should be gathered without making judgements yet. Therefore, it was decided to have a slideshow with the instructions. This added a visual explanation to the instructions and this allowed to show an overview of the most important aspects of the specific round.

7. Methods

Participants

In this study 38 persons participated, 27 were female and 11 were male, they were aged between 18 and 32, *M: 21.70, SD: 2.79.* All were students at the University of Twente. The participants formed groups of four persons (two groups of only three) and were placed in one of the two conditions. They all signed an informed consent. For 15 persons, participating in this experiment was part of a course they followed. They only filled in a questionnaire afterwards. The other 23 persons participated voluntarily, they filled in the questionnaires and took part in an interview as well.

Apparatus

Decision-making game

For the experiment, a board game was developed. The game board (size 105x105 cm) had two sides. The first side had nine blocks, each with a place for an issue card and five places for a position card. The second side of the board had three columns, each consisted of one place for an issue card. The board had 5 rows each with a place for a position card and argument cards. The design of the board can be found under Game Development

The game used 6 different cards, divided in four different symbols each in a different colour. Each person would get a set of cards in a different coloured symbol. Per person there were 9 Issue cards, 30 Position cards, 30 Argument + cards, 30 Argument – cards. 3 Pass cards, one Excellent-card and one Good-card.

In the control condition the group was given a A3 paper and pens, instead of the game.

Interview

The interview consisted of 6 questions that were semi-open, some of them had sub questions. The topics that were covered in the interview were related to the experience of the participant during the task, the structure, their thoughts on the final decision and their learning experience. There was a different version of the interview for the control group, where the focus of the questions was on the task or process instead of the game. The questions of the interviews can be found in Appendix 3.

Questionnaire

Three questionnaires were used in this research. The first and the second were questionnaires developed by TU/E on Game Experience (IJsselsteijn, de Kort, & Poels, 2013). The GEQ-

Core Module and the GEQ-Social Presence module were used. In the GEQ-Core module some questions were deleted that did not fit to this research. In the control condition, without the game, the same questionnaires were used. In the GEQ-Core Module some questions were changed to make them more suitable for a non-game context.

The third questionnaire was related to the research question. The questions were focused on the understanding of the instructions, the process of the decision task, and the apprehension of the content. In both conditions, the same questions were used, but the focus was either on the game or the decision task. The questionnaires can be found in Appendix 4.

Design

In this research a between-groups design was used. The groups were placed in one of the two conditions. They performed the decision task with or without the game. The participants were placed in the groups by their availability on time slots.

Procedure

The experiment started with instructions. First, theory on the argumentation-model was given, then the game was explained. Lastly, the case for the discussion was given, and there was some time for questions. The groups that did take part during the course they followed had chosen one of three topics, and prepared this beforehand. Because there was no time for preparation for the other groups, a simpler case was used on bicycle parking. All cases are explained in Appendix 1.

The game was played in four rounds. First a brainstorm, where issues and positions were generated. Second the argumentation, arguments could be given to the positions and new positions could be added. Third the evaluation, were the most important positions were selected. Last the final decision was made, when all participants agreed. The game instructions can be found in Appendix 1.

The groups in the No Game-condition received the same instructions and followed the same rounds (brainstorm, argumentation, evaluation, decision) and used the argumentation-model. However, they did not have the game materials and did not play by the rules. They documented their discussion on a piece of paper.

Afterwards the participants individually took part in the interview and then filled in the questionnaires.

8. Results

The results are divided in two separate parts. The first part will be on the data from the questionnaires. Where the data from the Game Experience Questionnaire (GEQ) - Core Module, the GEQ - Social Presence module and the task questionnaire will be presented. In the second part, the qualitative data from the interviews will be discussed.

8.1 Questionnaires

8.1.1 GEQ – Core Module

The Game Experience questionnaire – Core Module measured 7 concepts: *competence, sensory and imaginative immersion, flow, tension/annoyance, challenge, negative affect and positive affect*. The component scores are computed as the average value of its items, ranging from 0 to 4. With the component scores an independent samples *t* test is performed for the Game and No Game condition. The mean score and SD per condition and the p value for each component can be found in Table 1.

Table 1

Difference between Game and No Game on the GEQ - Core Module

	Game		No Game			
	M	*SD*	*M*	*SD*	*t*(36)	*p*
Competence	2.72	.51	2.50	.72	1.08	.287
Immersion	2.35	.72	2.14	.72	.90	.373
Flow	1.98	.77	1.70	.65	1.20	.237
Tension/Annoyance	.37	.56	.81	.83	-1.96	.058
Challenge	1.39	.56	1.29	.74	.478	.635
Negative affect	.66	.59	1.06	.97	-1.52	.136
Positive affect	3.02	.40	2.48	.63	3.19	.003*

Note. Mean and standard deviations are given for each component on the Game Experience Questionnaire-Core module for Game (n=20) and No Game (n=18).

*$p < .05$.

The last column shows that a significant difference is found for the concept *Positive Affect* for Game ($M = 3.02$, $SD = .40$) and No Game ($M = 2.48$, $SD = .63$), $p = 0.03$. The difference between Game and No Game in *Positive Affect is* 95% CI [0.197, 0.887]. For the concept

Tension/Annoyance a difference was found between Game (*M* = .37, *SD* =.56) and No Game (*M* = .81, *SD* = .83) This was nearly significant, with *p* = 0.058. Thus, only for *Positive affect* a significant difference was found. The Game condition scored higher on this concept.

8.1.2 GEQ – Social Presence Module

The Game Experience Questionnaire - Social Presence module, measured three components: *Psychological Involvement - Empathy, Psychological Involvement - Negative Feelings and Behavioural Involvement.* The mean scores on the two conditions can be found in table 2. The differences between the two conditions are rather small for all of the concepts. No significant differences were found.

Table 2

Difference between Game and No Game on the GEQ – Social Presence Module

	Game		No Game			
	M	*SD*	*M*	*SD*	*t*(36)	*p*
Psychological involvement - Empathy	2.84	.57	2.52	.75	1.50	.143
Psychological involvement - Negative Feelings	0.76	.41	.96	.39	-1.51	.139
Behavioural involvement	2.48	.57	2.60	.73	-.56	.579

Note. Mean and standard deviations are given for each component on the Game Experience Questionnaire-Social Presence module for Game (n=20) and No Game (n=18).

8.1.3 Task questionnaire

All the participants filled in a questionnaire of nine questions about the task and process, these were related to the research question. The questions were divided into three sub categories: the instructions, the process and the apprehension of the topic. Crosstabs were derived showing the responses in the Game and No Game condition for each question. Additionally, a t test was performed with the data from the Likert scale. Although, the data from the Likert scales are ordinal data, a parametric test was used in the analysis. As multiple sources state that data from Likert scales can be interpreted as interval data in a t test (Derrick & White, 2017; Norman, 2010). For the t test, the responses are interpreted as scores from 1 to 5 (e.g. Strongly disagree = 1, disagree = 2, undecided = 3, Agree = 4 and Strongly Agree = 5). The

overview of responses and the results from the t tests is shown next for the three question categories.

The first category was on the *instructions*. The questions in this category were: "I did understand the game/what we had to do"; "The instructions were clear"; "The instructions were helpful". For every question, the number of responses for each answers option can be found in table 3. For Q1 the participants in the Game condition did more often answer that they did (almost) completely understand what they had to do. At Q2, they indicated more often that the instructions were helpful in doing the task. For Q3 it is more often said that the instructions were clear. Overall a small difference can be found in this category. The persons in the Game condition did understand the instructions better, and do mention the instructions more often as helpful in the task.

Table 3

Responses on Questions in Category 'Instructions' for Game and No Game Condition

	Q1: I did understand what we had to do				
	Not at all	A little bit	Partly	Almost completely	Completely
Game	0	1	1	5	13
	0.0 %	5.0 %	5.0 %	25.0 %	65.0 %
No Game	0	1	5	5	7
	0.0 %	5.6 %	27.8 %	27.8 %	38.9 %
	Q2: The game or instructions were helpful in the decision-making process				
	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
Game	0	0	2	10	8
	0.0 %	0.0 %	10.0 %	50.0 %	40.0 %
No Game	0	1	5	7	5
	0.0 %	5.6 %	27.8 %	38.9 %	27.8 %
	Q3: The instructions were clear				
	Not at all	A little bit	Partly	Almost completely	Completely
Game	0	2	1	6	11
	0.0 %	10.0 %	5.0 %	30.0 %	55.0 %
No Game	2	1	3	7	5
	11.1 %	5.6 %	16.7 %	38.9 %	27.8 %

Note. Values are the number and percentages of responses on the questions in Category Instructions from the Task Questionnaire for Game (n=20) and No Game (n=18).

For the responses in the category instructions, the means were calculated per question and a t test was performed. The results can be found in table 4. This table shows that for none of the questions a significant difference was found between Game and No Game.

Table 4

Difference between Game and No Game on Instruction Questions

	Game		No Game			
	M	*SD*	*M*	*SD*	*t*(36)	Significance
Q1	4.50	.83	4.00	.97	1.72	.095
Q2	4.30	.66	3.89	.90	1.62	.114
Q3	4.30	.98	3.67	1.28	1.72	.094

Note. Mean and standard deviations are given for question 1-3 (category Instructions) from the Task Questionnaire for Game (n=20) and No Game (n=18).

The second category had to do with the *process* during the decision task. The questions: "The communication was structured"; "The amount of input each person had"; "The quality of the input" are in this category. The results can be found in table 4. In Q4 little difference can be found in their reaction on the structure of the communication. When comparing the number that answered Agree or Strongly Agree, only a small difference is found. For Q5 it can be seen that about the same percentage did answer that their amount of input was equal to others. Also in Q6, only small differences are found. The participants did not give different responses on the quality of input in the two conditions.

Table 5

Responses on Questions in Category 'Process' for Game and No Game Condition

	Q4: The communication in the group was structured				
	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
Game	0	2	2	13	3
	0.0 %	10.0 %	10.0 %	65.0 %	15.0 %
No Game	0	1	2	10	5
	0.0 %	5.6 %	11.1 %	55.6 %	27.8 %
	Q5: The amount of input I had during the discussion was				
	Much less than others	Less than others	About the same as others	More than other	Much more than others
Game	0	1	16	3	0
	0.0 %	5.0 %	80.0 %	15.0 %	0.0 %
No Game	0	1	14	2	1
	0.0 %	5.6 %	77.8 %	11.1 %	5.6 %
	Q6: The quality of the input of the group members				
	Very poor	Poor	Acceptable	Good	Very good
Game	0	0	4	15	1
	0.0 %	0.0 %	20.0 %	75.0 %	5.0 %
No Game	0	1	3	11	3
	0.0 %	5.6 %	16.7 %	61.1 %	16.7 %

Note. Values are the number and percentages of responses on the questions in Category Process from the Task Questionnaire for Game (n=20) and No Game (n=18).

For every question in the category Process, the mean of the responses was calculated and a t test was performed. The results are shown in table 6. For none of the questions a significant difference was found between the conditions.

Table 6

Difference between Game and No Game on Process Questions

	Game		No Game			
	M	*SD*	*M*	*SD*	*t*(36)	Significance
Q4	3.85	.81	4.06	.80	-.78	.439
Q5	3.10	.45	3.17	.62	-.38	.704
Q6	3.85	.49	3.89	.76	-.19	.851

Note. Mean and standard deviations are given for responses on question 4-6 (category Process) from the Task Questionnaire for Game (n=20) and No Game (n=18).

The last category was on the *apprehension* of the subject, consisting of the questions: "I did understand why the decision was made" "I did understand the argumentation model" and "I remember the issues, positions and arguments that were played or said". A slightly larger number of the participants in the Game condition did indicate that they (almost) completely understood why the final decision was made in Q7. Also, a small difference is found in Q8, where a few more respondents indicated that they completely understood the argumentation-model in the No Game condition. However, the number of responses is bigger in the Game condition when combining the options Almost Completely and Completely. Q9 shows that more persons in the No Game conditions did report to have remembered (almost) all of the issues, positions and arguments said during the task.

Table 7

Responses on Questions in Category 'Apprehension' for Game and No Game Condition

	Q7: I did understand why the final decision was made				
	Not at all	A little bit	Partly	Almost completely	Completely
Game	1	0	0	5	14
	5.0 %	0.0 %	0.0 %	25.0 %	70.0 %
No Game	1	1	1	2	12
	5.9 %	5.9 %	5.9 %	11.8 %	70.6 %
	Q8: I did understand the argumentation model				
	Not at all	A little bit	Partly	Almost completely	Completely
Game	0	0	1	6	13
	0.0 %	0.0 %	5.0 %	30.0 %	65.0 %
No Game	0	2	0	2	14
	0.0 %	11.1 %	0.0 %	11.1 %	77.8 %
	Q9: I remember the issues, positions and arguments that were said				
	None	Only a few	Half of them	Almost all of them	All of them
Game	0	1	6	10	3
	0.0 %	5.0 %	30.0 %	50.0 %	15.0 %
No Game	0	0	1	15	2
	0.0 %	0.0 %	5.6 %	83.3 %	11.1 %

Note. Values are the number and percentages of responses on the questions in Category Apprehension from the Task Questionnaire for Game (n=20) and No Game (n=18).

In the category *Apprehension*, again the means were calculated for every question and a t test was performed. The results are shown in table 8. For none of the questions in the Apprehension category a significant difference was found

Table 8

Difference between Game and No Game on Apprehension Questions

	Game		No Game			
	M	*SD*	*M*	*SD*	*(df) t*	*p*
Q7	4.55	.95	4.35	1.22	*(35)[a] .55*	.584
Q8	4.60	.60	4.56	.98	(36) .17	.866
Q9	3.75	.79	4.06	.42	*(29.48)[b] -1.52*	.140

Note. Mean and standard deviations are given for responses on question 7-9 (category Apprehension) from the Task Questionnaire for Game (n=20) and No Game (n=18).

[a] Missing value

[b] Equal variances not assumed.

8.2 Interviews

After transcribing the interviews, the transcripts were read through multiple times to orientate on the content of the interviews. The next step started by selection of important parts and *open coding* of quotes in the interviews. When some of the interviews were connected to codes, these codes were categorized and put together with similar codes. The new codes were then used to code the following interviews. After a while, these codes were reconsidered again and some changes were made to make sure the codes were matching the content of the interviews. Further changes were made along the process and in the end the final list of codes was again checked with the quotes in the interviews. This resulted in a final list of codes which was used to code all of the interviews, see table 6.

Table 9

Categorized Codes used in Coding of the Interviews

Categories	Codes	Explanation
Process	Structure	The way the process was structured
	Strategies and activities	Specific methods or activities that took place in the group
	Sequence of steps	The steps they took in the process
	Overview	Physical overview
	Start	How it started
Tool	Influence	Influence of the game or the explanation
	Positives/negatives game	Specific positive or negative points
Evaluation	Experience	How the participants experienced the task/their feeling about it
	Competence	Participants felt (not) able to do something
	Final decision	Remarks on the decision they made
Group	Collaboration and communication	How they worked together and the use of communication
	Input	Amount and quality of the input
	Group atmosphere	Experience of the group atmosphere
Other	Discoveries	Other remarks that were made

The code list does cover most of the information in the interviews. Additionally, the codes are in line with the content in both of the conditions. Only a few of the codes were mentioned only in the Game or only in the No Game condition. Next, a discussion of the appearance of the codes in the interviews will be given. This will be explained following the categories and codes from table 9. The information collected from the interviews will be explained per category to have similar information grouped. For every category, the associated codes will be discussed. Afterwards, a summary will be given on the most important points in the Game and No Game condition.

8.2.1 Process Category

8.2.1.1 Code: Structure

Participants in the Game groups indicated to have experienced a systematic flow. P19: *"what the game did, it gave us structure in laying things down. And then moving from one point to another point."* They felt that their thinking was more organised. The structure was caused by the rounds in the game and the turn-taking. It made the process more focused, the players paid more attention to the cards and topics and less to the persons. The arguments were more to-the-point.

One person said that the game was not structured enough, that it would have been better to discuss one topic at a time and then proceed. Another person mentioned that by writing up the topics on cards there can be some confusion on where to place what. Sometimes topics were slightly overlapping, but could not be placed in one block. P28:

> *"There were two issues and they had some parts that were overlapping. So those parts could be put together. But we were stuck with the cards. And some arguments and the positions didn't fit with the other issue. So, it was kind of overlapping, but you couldn't put them together."*

In the No Game groups, the participants who said there was a structure, indicated that this was because of the different rounds in the game. This helped them to recognize when to do what and to know what will come next. They used a systematic approach and did stick to one thing at a time. One person described this as more efficient, because you choose which of the topics to continue discussing. *P38: "Especially like the division in like four steps, that influenced it. Because we had more a systematic approach. Otherwise it would have been more like, not chaotic, more free-style kind of."*

On person said that their group did not follow the structure, they did go up and forth through the different rounds. This was not seen as negative, it still worked out for them.

8.2.1.2 Code: Strategies and activities

Some persons in the Game groups said that important activities were: letting others speak, letting other persons react on what is said and discussing what is said. The collection of many arguments was helpful to making a good decision. Compared to other situations two differences were mentioned: the discussion was more objective and the focus was on the common ideas on the table. Thus, not everyone was focused on their own input. P25: *"Sometimes when you have a discussion people tend to want to enforce their own ideas, and*

you got into more serious one-versus-one discussions. Whereas here we focused more on the ideas we had and not on specific individual ideas." P18 mentioned that everything that was said was *"just accepted"*, without resistance from the other players.

In the No Game groups, some said that they shared many ideas. Most of them cite that they did a lot of argumentation and/or discussion, which was helpful. In all the groups, the ideas were written down by one person. Sometimes they only wrote it down if it was realizable. And sometimes they already limited their discussion to only a few ideas early on. It was said that the organised discussion of the arguments was good. And that it helped in not giving arguments on all the ideas before proceeding to the next round. P39: *"I think it helped to first think of all the positions and not already about arguments about it. Because sometimes you already have an idea, and you throw it away, because you think it is not good."*

Some participants, in group 9 (No Game), were not satisfied with the activities in the end. They described this as "vague", or "not thinking". They experienced this as if they just picked one of the options, without a real reason. P35:

> *"To be honest I don't really know how was the end… How we came to the decision, because we didn't really discuss in the end like… I think, I, we first thought this one [points], and then I said maybe the underground, and the others didn't say anything to it. So, then everybody was like okay, fine… nobody did say anything against it. This was a little bit vague, and I think other people just followed."*

8.2.1.3 Code: Sequence of steps

In the No Game groups, some participants did describe the process. This was done by describing the different steps they took in the group. Most of them said that this was helpful and gave structure. So, they knew what they had to do. P31: *"We started with the brainstorming, so we came up with a few ideas and then we argued about what is easy to realize and what is too expensive. And then, in the end we made the final decision."* In the Game groups, the sequence of steps is not mentioned.

8.2.1.4 Code: Overview

Multiple participants in the Game groups said something about the overview the board gave. P18: *"You have it at hand, you have a look at it. And see it immediately. And you can visualize it, so I think it is easier to talk."* They said that the visualization gave structure. You can come back to certain points easily and you know what kind of input is needed at all times.

It helped to make it clear and keep track of everything. Nothing that was said was forgotten, because it was immediately written down. P22:

> *"Writing down what you talk about during brainstorming is important. I had brainstorms before in my study that sometimes we don't write it down, things get lost in discussion. This is a good way to keep track of the ideas."*

The participants in the No Game condition did not have the playing board at hand, but also in these groups there were two comments made on having an overview. They wrote down what they discussed on paper instead. Both said they liked to have this overview and that it was helpful. P37:

> *"For me personally it is always easier to see my options and to think about solutions if I really have it on paper. Because otherwise you have to keep everything in your mind. It's kind of hard, but having it on paper helps."*

8.2.1.5 Code: Start

Multiple times it is mentioned that the beginning of the game was somehow hard: it was 'hard to break', 'stark', 'doubtful', etc. P26: "W*hen you start with a subject you don't know exactly what you are going to talk about."* Most of them said that later on it went better. P18: *"It was at first a bit like complicated. Cause it was a topic I have never so much thought of. Like at first you have to think a lot."*

As well as in the No Game condition, people said that it was hard in the beginning, but later on this went better. One person said to be confused in the beginning. It was hard to find a start. P34: *"Well I think in the beginning it was quite hard to find a solution, but after a while it went okay."*

8.2.2 Tool Category

8.2.2.1 Code: Influence of the game or instructions

The overview the game board and the cards gave, was seen as an important influence of the game. Everything is visible and that helped in not forgetting certain points. The game gives a structure, which is seen as helpful. P26 said: "*I don't think the way the people think will change because of the game"*. Yet others said that it changed their thinking. The game is said to be helpful to '*break the ice'*, and helps everyone to participate. P20: *"You didn't really have the chance to pull yourself out of this game. So, I think that it influenced it quite much, so that it was in the end more fluent."*

Participants in the No Game groups said that they followed the instructions. P29: "*[The instructor] just told us what to do in the beginning. […] I don't think that it really influenced our thoughts, just guided them through the experience"*. In most of these cases, they followed the rounds which gave them a structure. Many participants indicate that the model structured their process. Also, often it is mentioned that the instructions were somehow confusing. Partly because the game was introduced to these groups, but could not be played. The explanation beforehand and the instructions during the task are described as abstract.

8.2.2.2 Code: Positives/Negatives Game

Participants told they liked the game. It gave structure and it helped to think over everything that was said, or to think differently. Nothing was left out of the discussion. P21: *"I think it is a good design, because you look at it in a different way. There is no tunnel vision."*

The turn taking was overall experienced as positive, everyone had a chance to speak and nobody was left out of the discussion. However, many participants also mentioned that the process became more interactive: they helped each other by giving input during someone's turn. One person said that the turns were good, but should be enforced a bit more. Because now sometimes people were overruled by other persons that took the lead.

There were given some negative points on the game as well. The game became a bit slow at some points. This was merely due to the turn taking which sometimes took too long. One participant explained to like the game, but would not like to use this in a real-life situation because it seemed a bit childish to use a game for this.

8.2.3 Evaluation Category

8.2.3.1 Code: Experience

Overall the participants experienced the game as fun and interesting. They found it interesting to interact with the others. Two persons said that it was not hard to play, P25:

> *"It made... something that would normally, like in a work seminary would be more of a task, made fun. And we really worked together in a fun way, in my experience it didn't really cost any effort to get to the decision."*

Some persons in the No Game condition said that they liked the experience. They liked to think about the topic and liked the collaboration in the group. P33: *"I really liked it. The girls were nice and friendly. We had creative ideas, so I was also motivated to participate and*

work for a solution." One person said to have felt very unprepared, there was some confusion during the task.

8.2.3.2 Code: Competence

One person said that the game became immediately clear once the discussion was started. Another person said that the task was hard, but the game enforced everyone to play. P20: *"You could just write down your ideas on nice cards and it was just in this round. You didn't really have the chance to pull yourself out of this game."* One person said that it was hard to come up with issues, at some point they could not really add new ones. Further, there were no comments in the Game groups about their competence.

Many of the participants in No Game said that the task was hard, or they were not sure what to do. One of the reasons they gave had to do with the topic. They found the case hard or thought they did not have enough knowledge on it. Others said that it was because they had never thought of this before or it was something that is not in your own hands. Some said it worked out anyway, when they were working on it. P35: *"I think it was really hard. Like we didn't even know each other and everyone was not really sure of what was expected. And I think this was really hard, to argument and to decide something."*

8.2.3.3 Code: Final decision

Many of the Game participants said that they agreed with the final decision, and that they were happy with it. P20: *"I feel quite well about it. So, I had a good feeling to place my puzzle piece at the end."* Some said they thought their solution would really work if it would be implemented. And many said that the decision consisted of multiple facets, which they liked. It was also mentioned by two persons that their group did miss things and the solution could have been better.

Some participants of the No Game condition said that the final decision in their group was good. They did understand why this decision was made. For example, because it was the best one to realize. A few said that they were not satisfied with it, or were unsure about it. This was for example because of the limits they had. Like, not having enough information about the topic.

8.2.4 Group Category

8.2.4.1 Code: Collaboration and Communication

In the Game groups, many comments were made on a positive collaboration and communication. P22: *"We talked with each other during someone's turn so, even when someone had his turn we kind of did it together. Because brainstorming, you don't do that on your own."* Listening to each other, helping each other, being a coherent group, having an open communication and having good interaction between or during the turns, were often mentioned. P24: *"The communication was open and people listened to each other. And together all their different ideas became real."*

One person said that in their group some misunderstandings took place, but they were not solved sufficiently. Further, one person said that in the group one player took a more leading role, and overruled other players.

In the No Game groups were many comments on describing what happened during the task: they listened to each other, let others speak out and helped each other. The collaboration was balanced, everyone participated. *P32: "Everyone had a different idea, and when someone didn't know something to say the other ones knew something to say. I think it really improved the whole group process and the decision process."* Further, it was indicated in one of the groups, that sometimes the communication was hard

8.2.4.2 Code: Input

The input in the Game groups is mostly described as good. Sometimes very obvious arguments were given as well. Many participants thought the amount of input between the players was equal. Some others said that it was not completely equal, but this was not seen as a problem. P24: "I think every player had an equal input. Maybe not in the amount of cards, but in the amount of thinking I suppose the input was equal."

Another point heard more often throughout the interviews is that the input was diverse, every player added different things. Moreover, the input of one player can motivate others to come up with new ideas.

Also, in the No Game groups, it is mostly said that the amount of input was equal. Or there were some differences that were not found disturbing. One person said that the players in their group did an equal amount of effort and not necessarily in the input itself. A few times it was said that all participants helped to give a diverse range of different input. Also, some persons indicated that they merely worked together, that the different arguments were

constructive for the whole group. P33: *"Positive, they are all constructive and helpful and also build on the ideas of another. So that is especially helpful"*

8.2.4.3 Code: Group atmosphere

In the Game condition, someone said that in their group they shared opinions, which helped to keep a flow in the process. Participants indicated many times they did or did not know each other. This was more often mentioned in the No Game condition. In one of the No Game groups this was said to have an influence on the task. They indicated things like distance between the actors, confusion and they said they were not sure on how to behave.

8.2.5 Other Category

8.2.5.1 Discoveries

Next to the comments on the game, the group mechanisms and the tool itself, some participants shared some interesting other thoughts after they had played the game. Some of the participants mentioned that working in a group has taught them something; that others had interesting ideas and that you can learn from others. And together you can create a better solution. They found it important to think about all the possibilities and write them down. P17: *"[I have learned] how many solutions there can be to one problem. If you have a good enough team, and if you are creative enough."*

Also, the structure was an important topic. Two persons said that they have learned a new systematic method for decision making. P25:

> *"I think I learned a fun way of tackling certain issues that we want to discuss, for one discuss in an objective manner and then secondly, come to a real conclusion in the end. It really forces you to come make a conclusion in the end. So, I think I learned a new way to tackle certain problems."*

In the No Game condition, participants mentioned that everyone comes up with different ideas, these ideas should be discussed and this process should not be rushed. One person mentioned that you have to compromise if you do such a task in a group. Also, the systematic approach was important. P39: *"What I will remember for my group is to first take everything that is possible and then think about the pros and cons. And not throw ideas away too early."*

8.2.6 Summary

8.2.6.1 Game groups

For the groups in the Game condition, the rounds in the game and the turn-taking were important for the structure of the process. The discussion was objective and more focused on the arguments. They paid attention to their common ideas written on the cards. The game board and the cards on the board, assisted them by giving an overview. This improved the structure of the process.

Participants said they liked the experience with the game. They found it interesting to interact with the others and think about the case. The collaboration went well in the groups. They did comment that the task was not hard, or that the game even made it effortless to work on the task. The input of the different players was seen as equal, everyone did try to give a fair amount of input.

8.2.6.2 No Game Groups

The groups in the No Game condition said that the different rounds in the discussion were helpful for the structure. They did stick to one topic before continuing to the next one. In all of the groups, there was always one person writing down what was discussed. This helped them in keeping an overview of the discussion.

It was observed by the instructor during the experiments that the groups without the game were less strict with following the explanation, than the Game groups. They did mostly follow the steps, but sometimes in a different way. These groups did go through the given structure more freely. Also, they were more focused on the instructor during the task. Besides, the sequence of steps during the task, was only mentioned in the group that did not play the game. The Game groups did not mention the steps they took.

The participants in the No Game group liked to work on the task, especially the interaction with the other group members was mentioned often. The input of the group members was equal. In some groups, they worked together on constructing new arguments. Further, comments were made in these groups on their competence. It was indicated that the task was hard, more often than in the Game groups. For some participants, this caused some confusion.

9. Discussion

This research was set up to examine how a game could contribute to teaching collaborative decision making. Therefore, a serious game was designed which assists in learning the use of an argumentation-model during the decision-making process. The game followed the IBIS argumentation-model (Kunz & Rittel, 1970). The *issues*, *positions* and *arguments* were discussed in different game rounds. The input of the players was written down on cards which they could place on the game board. In the end of the game, a final decision was made on a solution to the problem. In the control group, participants did work on the same task and used the argumentation model, but did not have the game. Participants were randomly selected in groups of four people to work on a task, either with the game or without.

Afterwards, their experience was measured in questionnaires and an interview. Three different questionnaires were filled in by the participants. Only in one, the Core module of the Game Experience Questionnaire a significant difference was found. The participants who played the game scored higher on Positive Affect than the participants who did the task without the game. In the Social Presence Questionnaire and the Task Questionnaire no significant differences were found.

Additionally, the participants were interviewed to get a deeper insight into their experience during the task. The interviews were used to find important topics and themes throughout the groups in the Game and No Game condition. Some differences and similarities were found between their response. For groups in both of the conditions the structure was an important topic. They said that that the structure was helpful for their discussion. In the Game groups, it was said that the discussion was more focused on the arguments, and therefore became more objective. In the No Game condition, some groups did not completely follow the structure from the instructions, they did use it in their own way. In the Game groups, the game board was helpful to keep an overview of the discussion. The players wrote down their own input on cards and placed them on the board. In the No Game groups, the participants wrote down what they discussed as well. However, in these groups was only one person writing and they did not do this together.

Comparing the results from the Game and No Game condition, some interesting differences were found. In No Game, the participants were more focused on their competence, they said more often that the task was hard to work on. The game probably guided the participants during the process. It was more intuitive to work with the game, and therefore they were possibly less worried about their competence during the game.

Additionally, in the No Game groups, they talked more often about the influence of the instructor and the instructions before and during the task. They were more focused on how the task had to be executed. Whereas the Game participants just listened to the instructions and further explored the rules on the go. Furthermore, in the No Game groups, persons did often indicate the sequence of steps during the task. In the Game groups, nobody talked about the steps they took. This may indicate that the No Game groups had to put more effort in how to work on the task and this did not go intuitively. There are two possible explanations that may have caused this difference. First, the No Game participants were more aware of the underlying information, meaning that they will remember it better. Thus, they would be better in reproducing this method in a next situation of solving a decision task. Or, secondly, in the Game groups this information was simply learned by doing. These persons learned in a more authentic way during the experience. That means, they learned to use this model by working with it instead of hearing the same information by instructions.

Besides differences between the two conditions, similarities were found as well. The role of the other group members was found to be an important aspect in both of the conditions. A good collaboration and a nice group atmosphere were helpful in the process. Some said they knew each other already, which had a positive influence. Or conversely, that the task was hard because they did not know the other group members before. In the end, many participants said they liked the interaction with others and they learned something from fellow group members. Also, some said they were motivated by other persons to think of more ideas. This can be supported by Barron (2009), saying that group work can often accomplish things that would not get accomplished by individuals alone. Thus, collaboration can motivate people to achieve more.

The game was used to teach the learners how to use an argumentation model in a discussion. Expected advantages of using an argumentation model are maintaining consistency in the decision-making process, keeping track of the discussion, and in the end it helps to communicate the reasoning process (Regli et al., 2000). All of these goals were heard in the interviews. The discussion was objective and not much influenced by the personal preferences, therefore it was more consistent. It became clear that the use of the IBIS argumentation-model worked well. It helped to first choose *issues*, then think of *positions* and then come up with *arguments for* and *against* them. And in the end, make a *decision.*

Further, writing down the arguments helped in keeping track of the discussion and it helped the participants knowing what they should do next. This was also found by Kultima, Niemelä, Paavilainen, & Saarenpää (2008): a game board can enhance the transparency of a

complex systems and makes it easier to understand its complexity. In the end of the game, the cards on the game board functioned as a design rationale. The result communicates the reasoning process and justifies why the decision was made. Which is one of the goals of a design rationale (Burge & Brown, 1998).

The main goals of group decision making are achieving consensus, pooling expertise and knowledge, and having a corrective function for bias (Stasser & Titus, 1985). The first two goals were achieved, according to the interviews. Many participants said that their group did find a solution that the whole group agreed with. Also, the participants were satisfied with the amount and the variety of input of other players. However, the corrective function is not completely covered. One person indicated that nobody was critical on the input of other members, everything was just accepted and written down. On the other hand, in a next round in the game there was the possibility to evaluate the suggestions and remove them. Since this feature is not fully covered yet, improvements can possibly be made on the corrective function in the game.

In the experiment were found some limitations as well. First, working with the model and dividing the input to *issues, positions* and *arguments w*as experienced as helpful. However, it sometimes turned out that this division was not always completely right. There were *positions* that were partly overlapping, these was hard to place with the right *issue*.
Also, different *issues* seemed to be inter-related. In some cases, issues were later renamed or replaced. Groups then either put the position in on both *issue*-blocks or they chose the most important one to place it on. So, the groups did find ways to cope with these problems, but the model was not always matching with the real situations and did sometimes cause some confusion.

Secondly, the instructions were not completely clear in the No Game condition. In the experiment, it was chosen to give both conditions the instructions of the game to keep the conditions similar. So, the No Game condition did first get the instructions on the game and then on their own process. However, it was not always clear for these participants why they received the instructions for the Game. Overall, they needed more additional explanation during the task. So, the instructions could have been more to the point in the No Game condition, to make them immediately clear in both conditions.

Lastly, a remark can be made on the case that was used in the experiment. The participants were asked to think of new possibilities to park bikes on campus, which was not a very hard task. Most participants agreed on the ways how to solve this problem. So, there were not much differences between their views on the problem. Whereas differing opinions of

group members are often found as a source of potential problems in a group decision-making process (Grünig & Kühn, 2005), this has not yet been tested in this game. It would be interesting to see if the game would still help to keep the discussion objective under these circumstances. For now, it is not known how the game would have supported if the participants had big disagreements, because there was not much conflict in the groups.

In further research, the game should be tested with a different case. This will show how the game would assist groups working on another case. Further, an improvement can be made on the instructions in the No Game condition, these should be more clear. No confusion should exist about the game instructions, if they are not going to play the game. A further suggestion would be, to let groups do the task in both conditions in a within-subjects design. Then participants would be able to compare both situations. In the current research participants in Game and No Game did describe their experience with the task, but had no idea how the other condition would have been. The subjects cannot compare the two conditions and cannot indicate if they have a preference for one of the conditions. Furthermore, it could be helpful to have participants work with the game multiple times. Most participants did understand the game early on. However, they needed some time at the beginning before they understood it completely and they were ready to focus on the task.

This research has shown that the game is experienced quite well. It was helpful to use the argumentation-model for solving a decision task. However, there were not much differences found between giving participants the information by instructions only or letting them play the game to learn the model. And as described, the No Game groups did use the same argumentation model and went through the different rounds of discussion. Although, a bit more freely then the Game groups. This could mean that using the argumentation model itself is already helpful by giving the groups more structure in their process. Which should be examined to make statements about first. However, it was found that the Game groups scored higher on *Positive affect*. This means that one important goal of serious games that is having fun, is accomplished with the decision-making game. Additionally, the game has the advantage that the learners are less focussed on an instructor. They are able explore the rules independently and can learn by doing. So, in the end it is found that making the argumentation more structured and using an argumentation-model can be helpful in a decision-making process. A game is a good method to contribute to learning such skills. Because the learner will experience more fun than in a more traditional way of learning, like giving instructions.

10. Conclusion

In this research, a decision-making board game was developed. The purpose of the game was to teach groups how to maintain a structure in a decision-making process. The decision-making game serves as a guide towards the final solution. The game was made up of different rounds: a brainstorm round, an argumentation round, an evaluation round and the final decision round. The game followed the IBIS argumentation-model; During the different rounds *issues* were discovered, *positions* gathered*, arguments* for and against were given and in the end a final *decision* was made. The group members wrote their input down on cards and placed them on the game board.

The given structure was experienced helpful during the decision-making process. For both the participants who played the game and the participants in the control groups, the structure assisted them in making a good decision. Most participants were satisfied with the final decision. It was found important to keep track of the discussion, by writing it down on the game board or on paper.

A difference between the conditions was found on their Positive affect. The Game group scored higher on Positive affect. In other words, these participants were happier during the task. This means that the game served one of its main purposes, that is having fun during the learning experience.

It is important that actors learn how to make a good decision. Teaching them to use a structured method is helpful, it makes sure that different alternatives are gathered and a good final decision can be made. The decision-making game was experienced helpful and had as main advantage that players experienced fun during the task. Therefore, it can be said that the game contributes to the learning process of collaborative decision-making process.

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12. Appendix

Appendix 1 - Game instructions

Instructions game
You are going to work on a decision task and in the end, you will make a decision as a group. To get to this decision you are going to use a rational decision model.

The argumentation model is based on:
Issues: different design questions that should be discussed,
Positions: options to resolve the issues.
Arguments pro to support or **arguments con** to object the positions, give evidence with each argument**.**
Decision will be taken at the end of the game, together as a group.

Goal: Use a structured argumentation and group collaboration to get to a solution for the design problem.

Round 1:
In this round issues and positions can be played on the first side of the board
Roll the dice to indicate who starts. In each turn, a player can play 1, 2, or 3 cards.
Discuss the cards that are played.

After ± 10 minutes evaluate the issues that are found. Choose which ones to take to the next round. That can be 1, 2 or 3 issues. Place them at the other side of the board.

Round 2
Now positions, arguments pro and arguments con can be played. Again, roll the dice to indicate who starts. Players can play 1, 2 or 3 cards.
Positions can be new ones or adjust the ones on the board. For the arguments give evidence for every card. Discuss the cards you play
After ± 10 minutes continue to round 3.

Round 3
Each player uses place their evaluation cards on best and second-best option of the position. Discuss those with highest scores.

Round 4
Every player can have a final word on the available options. Then, one player can propose a final decision and play de decision 'card' (puzzle piece). This can be one position or a combination of multiple positions. The game is over if everyone agrees and has played their piece of the puzzle.

Case A: "*bicycle parking*"
Design a bicycle parking system for the university.

Some possible sub questions will be given if needed

1. Structure of the parking system. (How will it actually look like?)

2. Implementing the system (Are you going to need employees for everyday work or is it going to be automated?)

3. Sustaining the system (how will you make sure that the system is used?)

Case B: *"Intelligent systems"*
Group 1 until 4 prepared one of the three following cases:

1. Intelligent scheduling: the first thing that we need to think about before organize a

   meeting is the availability of each potential participants. Schedule a meeting which favours everyone's agenda is not an easy task. Some people don't usually update their electronic agendas; some people don't feel like to create or respond to a tedious doodle form; some people don't necessarily realize the conflicts between the meeting date and their agenda etc.

   You are required to design an intelligent system, that intelligently update people's agenda. Some important issues need to be addressed:

   - How to get the input of the updates? (sensors, emails, web ...)
   - How to update people's agenda when there are conflicts?
   - Privacy issue.
   - Feasibility
2. Intelligent grouping: a university campus is a place of innovation, and in order to materialize an idea, we need to collaborate with the right person. How to find the right person to work with is a tricky question?
   You are required to design an intelligent system, that allows people to look for team members for an innovative project. Some important issues that need to be addressed are as follows:
   - How should the interface of this system look like to facilitate searching?
   - How should this system intelligently identify people's skills?
   - How to protect the idea's confidentiality?
   - Privacy issue.
3. Intelligent navigation for visually impaired people: navigation on the campus is not an easy task for everyone, especially for visually impaired people. Visually impaired people can't use their eye sight for navigation, so other modalities should be used to facilitate their navigation.

   You are required to design an intelligent system, that can guide visually impaired people on the campus, some important issues are:

   - How to detect intelligently where the user wants to go?
   - How to plan the itinerary that suits the user's interests?
   - Which modality can be used in this intelligent system?

Appendix 2 - Feedback pilot study

Input participants

After the pilot study the participants were asked in an open discussion about their experiences with the game, the explanation and the questionnaires. They were free to give any feedback. Next, they were asked on their opinion on certain aspects of the study. A documentation summary of this discussion is given here.

Overall experience

The game is a good way to have semi-structured brainstorm and decision-making process. Sometimes when having a brainstorm people are not fully involved. With the game contribution of each actor is more equal and everyone pays attention the whole time.

At the beginning, the game was a bit hard. It took some time to understand it. Also, it was sometimes hard that you had to wait for your turn to play a new item. Because you came up with something, and forgot it when it was your turn. However, the turns were good as well, it made it very easy to give input. A good solution for forgetting something is to write it down on your card already.

We liked that the brainstorm did not go too structured. It was possible to play issue cards and position cards together in the same round. We were not too limited on when to play a certain card. And because you write everything down on the cards, you remember everything now. Thus, you don't waste time, what usually happens when a brainstorm takes place in a group.

Instructions

The instructions were not completely clear at the beginning. Maybe when an example for all the cards would be given it would be clear directly. Also making the instructions more visual would be helpful, for example give a hand-out.

Design

Nice that the design is minimalistic. The symbols and minimalistic design made it clear what to do. The colours on the cards were not totally clear, we knew that each colour was for one player but not why. Also, it might have some influence on the decision. That a player would rather pick is own idea. However, the colours do not distract. And it showed how much each person has contributed.

Influence of the game

We think that the game was helpful. Without this game, a brainstorm or discussion usually is not so organised. We think we would have come up with less issues, positions and arguments. It helped to think of other issues, when you would usually stop thinking further. We saw there were many empty places left for the cards, that encouraged us to think further and think of new ideas. Therefore, we came up with more diverse issues and positions

The time was a bit short, maybe the rounds should be a bit longer. Otherwise it would be helpful if comments on the use of time would be given. Further, it could be helpful if the game leader or researcher would give the participants hints in ambiguous situations. For

example, if one position could suite multiple issues, hint whether they should play one or multiple of the position. Another idea is to limit the number of issues to take to the next round depending on how many there were place on the board in the first round.

Observations

Next to the feedback of the participants the researcher observed the experiment carefully. From these observations, possible changes in the design setting could be made. The pilot study started by instructing the participants on the argumentation-model and how to play the game. At first when starting with the game, this did not go very smoothly. They were a bit in doubt on how to play and when to play which card. Another thing that could be noticed was that they did not discuss and collaborate a lot when they started. They were very much focused on the game, thus writing the concepts on the cards and placing them on the board. They seemed a bit insecure at the beginning of the game. They did not know what to play, or forgot what they had come up with when it was their turn. Therefore, the turn of one participant was sometimes long. This made the game a bit slow, and participants were not fully focused anymore.

The 'uneasy' start was probably caused by the instructions. Some changes in the instructions could be helpful First the instructions should be a bit easier to understand, possible by giving an example. Second, by giving the participants a minute to think about the subject before starting the game could possibly give them enough time to prepare a few ideas already. Also, a consideration of the turns should be made. The turn-taking can make the game a bit slow. However, when the participants prepare their turn this can go quickly. The turns have a positive effect that it gets very easy to give input.

Appendix 3 - Interview Questions

Interview Game

1. How was your experience with the game?
   How did the game influence the process?

2. How do you feel about the final decision?
   Did you understand why this decision is made?

3. How was the input of the different players?
   Quality?
   Equal amount?

4. How was the discussion structured?
   How was the communication in the group?

5. What did you learn?

6. Any other comments?

Interview No Game

1. How was your experience with decision-task?
   How did the explanation influence the process?

2. How do you feel about the final decision?
   Did you understand why this decision is made?

3. How was the input of the different players?
   Quality?
   Equal amount?

4. How was the discussion structured?
   How was the communication in the group?

5. What did you learn?

6. Any other comments?

Appendix 4 - Questionnaires

Task questionnaire – Decision-making Game

Group number:	Date:
Participant number:	Age:
Symbol in the game:	Sex:

Please fill in the following form on the game and the discussion in your group:

I did understand the game				
○ *Not at all*	○ *A little bit*	○ *Partly*	○ *Almost completely*	○ *Completely*
The communication in the group was structured				
○ *Strongly disagree*	○ *Disagree*	○ *Undecided*	○ *Agree*	○ *Strongly agree*
I did understand why the final decision was made				
○ *Not at all*	○ *A little bit*	○ *Partly*	○ *Almost completely*	○ *completely*
The game was helpful in the decision-making process				
○ *Strongly disagree*	○ *Disagree*	○ *Undecided*	○ *Agree*	○ *Strongly agree*
I did understand the argumentation model (issue, proposition, arguments, decision)				
○ *Not at all*	○ *A little bit*	○ *Partly*	○ *Almost completely*	○ *completely*
I remember the issues, positions and arguments that were played				
○ *None*	○ *Only a few*	○ *Half of them*	○ *Almost all of them*	○ *All of them*
The amount of input I had during the discussion was				
○ *Much less than others*	○ *Less than others*	○ *About the same as others*	○ *More than others*	○ *Much more than others*
The instructions were clear				
○ *Not at all*	○ *A little bit*	○ *Partly*	○ *Almost completely*	○ *completely*
How was the quality of the input of all group members (e.g. good arguments used)				
○ *Very poor*	○ *Poor*	○ *Acceptable*	○ *Good*	○ *Very good*
Other Comments:				

Game Experience Questionnaire – Core Module (Decision-Making Game)

Please indicate how you felt while playing the game for each of the items:

		Not at all	Slightly	Moderately	Fairly	Extremely
1	I felt content	○	○	○	○	○
2	I felt skilful	○	○	○	○	○
4	I thought it was fun	○	○	○	○	○
5	I was fully occupied with the game	○	○	○	○	○
6	I felt happy	○	○	○	○	○
7	It gave me a bad mood	○	○	○	○	○
8	I thought about other things	○	○	○	○	○
9	I found it tiresome	○	○	○	○	○
10	I felt competent	○	○	○	○	○
11	I thought it was hard	○	○	○	○	○
12	It was aesthetically pleasing	○	○	○	○	○
13	I forgot everything around me	○	○	○	○	○
14	I felt good	○	○	○	○	○
15	I was good at it	○	○	○	○	○
16	I felt bored	○	○	○	○	○
17	I felt successful	○	○	○	○	○
18	I felt imaginative	○	○	○	○	○
19	I felt that I could explore things	○	○	○	○	○
20	I enjoyed it	○	○	○	○	○
22	I felt annoyed	○	○	○	○	○
23	I felt pressured	○	○	○	○	○
24	I felt irritable	○	○	○	○	○
25	I lost track of time	○	○	○	○	○
26	I felt challenged	○	○	○	○	○
27	I found it impressive	○	○	○	○	○
28	I was deeply concentrated in the game	○	○	○	○	○
29	I felt frustrated	○	○	○	○	○
30	It felt like a rich experience	○	○	○	○	○
31	I lost connection with the outside world	○	○	○	○	○
32	I felt time pressure	○	○	○	○	○
33	I had to put a lot of effort into it	○	○	○	○	○

GEQ – Social Presence Module (Decision-Making Game)

Please indicate how you felt while playing the game for each of the items:

		Not at all	Slightly	Moderately	Fairly	Extremely
1	I empathized with the other(s)	○	○	○	○	○
2	My actions depended on the other(s) actions	○	○	○	○	○
3	The other's actions were dependent on my actions	○	○	○	○	○
4	I felt connected to the other(s)	○	○	○	○	○
5	The other(s) paid close attention to me	○	○	○	○	○
6	I paid close attention to the other(s)	○	○	○	○	○
7	I felt jealous about the other(s)	○	○	○	○	○
8	I found it enjoyable to be with the other(s)	○	○	○	○	○
9	When I was happy, the other(s) was(were) happy	○	○	○	○	○
10	When the other(s) was(were) happy, I was happy	○	○	○	○	○
11	I influenced the mood of the other(s)	○	○	○	○	○
12	I was influenced by the other(s) moods	○	○	○	○	○
13	I admired the other(s)	○	○	○	○	○
14	What the other(s) did affected what I did	○	○	○	○	○
15	What I did affected what the other(s) did	○	○	○	○	○
16	I felt revengeful	○	○	○	○	○
17	I felt schadenfreude (malicious delight/ leedvermaak)	○	○	○	○	○

Task questionnaire – No Game

Group number: Date:
Participant number: Age:
Sex:

Please fill in the following form on the discussion in your group:

I did understand what we had to do				
○ *Not at all*	○ *A little bit*	○ *Partly*	○ *Almost completely*	○ *Completely*
The communication in the group was structured				
○ *Strongly disagree*	○ *Disagree*	○ *Undecided*	○ *Agree*	○ *Strongly agree*
I did understand why the final decision was made				
○ *Not at all*	○ *A little bit*	○ *Partly*	○ *Almost completely*	○ *completely*
The instructions were helpful in the decision-making process				
○ *Strongly disagree*	○ *Disagree*	○ *Undecided*	○ *Agree*	○ *Strongly agree*
I did understand the argumentation model (issue, proposition, arguments, decision)				
○ *Not at all*	○ *A little bit*	○ *Partly*	○ *Almost completely*	○ *completely*
I remember the issues, positions and arguments that were said				
○ *None*	○ *Only a few*	○ *Half of them*	○ *Almost all of them*	○ *All of them*
The amount of input I had during the discussion				
○ *Much less than others*	○ *Less than others*	○ *About the same as others*	○ *More than others*	○ *Much more than others*
The instructions were clear				
○ *Not at all*	○ *A little bit*	○ *Partly*	○ *Almost completely*	○ *completely*
How was the quality of the input of all group members (e.g. good arguments used)				
○ *Very poor*	○ *Poor*	○ *Acceptable*	○ *Good*	○ *Very good*
Other Comments:				

Game Experience Questionnaire – Core Module (No Game)

Please indicate how you felt while doing the task for each of the items:

		Not at all	Slightly	Moderately	Fairly	Extremely
1	I felt content	○	○	○	○	○
2	I felt skilful	○	○	○	○	○
4	I thought it was fun	○	○	○	○	○
5	I was fully occupied with the discussion	○	○	○	○	○
6	I felt happy	○	○	○	○	○
7	It gave me a bad mood	○	○	○	○	○
8	I thought about other things	○	○	○	○	○
9	I found it tiresome	○	○	○	○	○
10	I felt competent	○	○	○	○	○
11	I thought it was hard	○	○	○	○	○
13	I forgot everything around me	○	○	○	○	○
14	I felt good	○	○	○	○	○
15	I was good at it	○	○	○	○	○
16	I felt bored	○	○	○	○	○
17	I felt successful	○	○	○	○	○
18	I felt imaginative	○	○	○	○	○
19	I felt that I could explore things	○	○	○	○	○
20	I enjoyed it	○	○	○	○	○
22	I felt annoyed	○	○	○	○	○
23	I felt pressured	○	○	○	○	○
24	I felt irritable	○	○	○	○	○
25	I lost track of time	○	○	○	○	○
26	I felt challenged	○	○	○	○	○
27	I found it impressive	○	○	○	○	○
28	I was deeply concentrated in the discussion	○	○	○	○	○
29	I felt frustrated	○	○	○	○	○
30	It felt like a rich experience	○	○	○	○	○
31	I lost connection with the outside world	○	○	○	○	○
32	I felt time pressure	○	○	○	○	○
33	I had to put a lot of effort into it	○	○	○	○	○

GEQ – Social Presence Module (No Game)

Please indicate how you felt while doing the task for each of the items:

		Not at all	Slightly	Moderately	Fairly	Extremely
1	I empathized with the other(s)	○	○	○	○	○
2	My actions depended on the other(s) actions	○	○	○	○	○
3	The other's actions were dependent on my actions	○	○	○	○	○
4	I felt connected to the other(s)	○	○	○	○	○
5	The other(s) paid close attention to me	○	○	○	○	○
6	I paid close attention to the other(s)	○	○	○	○	○
7	I felt jealous about the other(s)	○	○	○	○	○
8	I found it enjoyable to be with the other(s)	○	○	○	○	○
9	When I was happy, the other(s) was(were) happy	○	○	○	○	○
10	When the other(s) was(were) happy, I was happy	○	○	○	○	○
11	I influenced the mood of the other(s)	○	○	○	○	○
12	I was influenced by the other(s) moods	○	○	○	○	○
13	I admired the other(s)	○	○	○	○	○
14	What the other(s) did affected what I did	○	○	○	○	○
15	What I did affected what the other(s) did	○	○	○	○	○
16	I felt revengeful	○	○	○	○	○
17	I felt schadenfreude (malicious delight/ leedvermaak)	○	○	○	○	○

Appendix 5 - Interviews

30-11-2017 Group: 5 (Game) Participant: 17
Q: How was your experience with the game?
A: I really enjoyed it. It was fun and kind of like at first, I think the thinking was a bit sub? As the game progressed, like everyone was sort of stimulated, start thinking and coming up with creative ideas and think practically. I think the group was really nice. So, everything went well.

Q: How, do you think, did the game influence the process?
A: It kind of made the thinking more organised. Cause it is not like you just drop down your ideas. It is sort like you have a whole system. As how the thinking is going to be evaluated and so on. So, it was good

Q: How do you feel about the final decision?
A: I think the final decision could actually work. If it had to be put into practice it really could work, and provide a good long-term solution. So…

Q: Did you fully understand why this decision is made?
A: As in like the scope of the study... Or?
Q: Ehm, like did you understand, all arguments and other input that leaded to this decision?
A: Oh, yes.

Q: How was the input of the different players?
A: I think they were really good. They really came up with good arguments, and good you know, they raised good issues and good solutions. So yes, it was good.

Q: And what about the amount of input of each player?
A: Everyone pitched in kind of a fair amount, some more than others, but everyone sort of participated. None of the persons stayed completely quiet.

Q: How was the discussion structured?
A: It was well structured. Like, there was definitely a flow. Just like, it was very good.
Q: How was the communication in the group?
A: The communication was very good, we all listened to each other. We all actively listened to each other and we all, like everything sort of coherent. We weren't saying things on top of each other and weren't saying things completely different to what the other was saying. There was like a good sort of coherence.

Q: What do you think you did you learn while playing the game?
A: Just how many solutions there can be to one problem. If you have a good enough team, and if you are creative enough.

Q: And do you have any other comments?
A: No

30-11-2017 Group: 5 (Game) Participant: 18
Q: How was your experience with the game?
A: I think it was quite good, because it was at first a bit like complicated. Cause it was a topic I have never so much thought of. Like at first you have to think a lot. But I think it was quite good, because I like this kind of argumentation-things

Q: How do you think that the game influenced the process?
A: The process of argumentation?
Q: Yes, the discussion, and everything
A: I think it influences it very positively. Because you have like an immediate look on it. And every argument was immediately attended, and you can always, like... you have it at hand, you have a look at it. And see it immediately. And you can visualize it, so I think it is easier to talk.

Q: How do you feel about the final decision?
A: Very good, because it was actually my opinion too. And I thought the decision-making was very good, because we discussed it very reasonable. Everyone waited, everyone was heard and everyone was included. It was well-balanced, and I think everyone was satisfied with the last decision. No one was like the leader and no one was closed-out. I think it was very fair what we have done.
Q: Did fully you understand why this decision is made?
A: Yes, I think because we all shared like the same opinion, had the same attitude. So, it was quite easy because from the beginning we [thought] the same

Q: How was the input of the different players?
A: I think it was well-balanced. I think one player, he added the most, because he had the most ideas. But I think everyone tried and everyone was equally included. Just, didn't had the most ideas
Q: And what about the quality of the input?
A: Yes, the arguments were very good, it was not like rubbish everything had a reason. Everyone was like a part of the main problem. Yes, I think it was very good and I think we haven't missed something. So, it was very reasonable what we have done

Q: How was the discussion structured?
A: It was good too I think, because no one was like keep down or no one was like praised. So, everyone really said their opinion what they thought.
Q: How was the communication in the group?
I don't know because, I think it was very good because what I said, there was no dominance or something. But I recognized that in the end, I mean explained it to everyone but I think it is part of the game, we just wrote it down and threw it in the middle.
Q: You mean that you missed the discussion on the topic?
A: Yes, that maybe that when you write down an argument, it is your argument and it is just like accepted.
Q: What did you learn in the game?
A: Yes, I learnt that it may be interesting to hear what other people think, because they came up whit ideas you didn't think they exist. An I think that I learnt that it is always good to hear what other people think about certain topics. And that you can always learn something from others, that it is always good to value each opinion equally. Because everyone has had their good ideas.

Q: Do you have any other comments?
A: no, not really.

30-11-2017 Group: 5 (Game) Participant: 19
Q: How was your experience with the game?
A: It was good, it was… one is, I got to meet new people from my own study that I didn't know. And otherwise, it was nice because everyone was on the same page. Everyone was following the same flow of thougt. So, I think it was nice
Q: How do you think the game influenced the process?
A: It gave structure, because it is something that we are also learning, saying that before acting of people have this mind map of different things. So, what the game did, it gave us structure in laying things down. And then moving from one point to another point. That was what I learned, it was nice

Q: How do you feel about the final decision?
A: It is a very commonly decision, which is very good because all the three ideas that we had are in there and they are all connected and any idea of the ideas can be implemented first and the other two can follow. I am pretty happy with the way the decision came out.
Q: Did fully you understand why this decision is made?
A: Yes, because it is a problem everybody sess. This is a very practical solution that everybody came up with. And easily implementable

Q: How was the input of the different players?
A: Some of them had very good arguments, and some of them were more creative and coming up with new positions. So, I think that's what comes to good decisions. That people coming up with ideas and flash point and then people processing them and giving encounter to them

Q: And what about the amount of the input of the different players?
A: I think, two players they had more input relatively, compared to another player. I think everybody had a fair part of input here.

Q: How was the discussion structured?
A: Quite easy, it was good. It was nice, even in the beginning when we were just coming up with issues it was still a little hard to break... But as soon as the issues were recognized, immediately the discussions were easy to make.
Q: How was the communication in the group?
A: Very good. All clear

Q: Did you learn something from the game?
A: Yes, a structured part-flow, that I said. It is something we all need to do in general, because with tests and... considering that the most of us are procrastinators. That is one of the reasons that nobody, that some of us don't do work, because we don't have structure. That is a good take from this game, just to put structure to things in flow.

Q: Do you have any other comments?
A: No, I think it was great

30-11-2017 Group: 5 (Game) Participant: 20
Q: How was your experience with the game?
A: Yes, I think it was nice. In the beginning, it was a little bit stark, and then it got more fluent. So, I liked that. Interesting ideas coming up.

Q: How do you think that the game influenced the process?
A: I think when... like I said that it was stark at the beginning and no one really had an idea and maybe no one really wanted to tell ideas they had. It was just like you had this game played and... you could just write down your ideas on nice cards and it was just in this round. You didn't really have the chance to pull yourself out of this game. So, I think that it influenced it quite much, so that it was in the end more fluent.

Q: How do you feel about the final decision?
A: I feel quite well about it. So, I had a good feeling to place my puzzle piece at the end. Yes, I think it was, I really think that if you would work on that and make it more specific that it would work here.

Q: Did you fully understand why this decision is made?
A: Yes, I think so. Of course, everyone placed the cards in the same parts, but I think that it is also the arguments you provide yourself, they are your ideas you just, you have more, a better. you can imagine it better, what it is about, so I can understand.

Q: How was the input of the different players?
A: It was different I think. Two where quite active from the beginning on. Me and another player were more silent in the beginning, but I think that changed a little bit. So, it was different in some way.
Q: What about the quality of the input?
A: I think the quality was quite good. Sometimes there were little misunderstanding. that somebody said something and the others were: "okay...??" But, yes nobody said something in those situations, not always. But I think in general the quality was good.

Q: How was the discussion structured?
A: Because of these rounds it was just... I didn't really like the structure, because you don't have one argument and issue and place all the arguments to this issue. But it was just okay, then flipping to this and then flipping to that, I would prefer something more structured. But it was just in another way structured.

Q: How was the communication in the group?
A: I think it was good, maybe the names were missing. It was all the time like: "She said...", etc. It was anonymous, we did not know each other... The communication was good, everyone was talking in English and if words were missing everybody tried to understand what the other one was thinking.

Q: Do you think you learnt something from the game?
A: From the discussion or from the topic?
Q: More on the discussion, or both
A: Well, maybe not really learned something. But being more open, getting one with the people around and not being afraid of saying something

Q: Do you have any other comments?
A: No, I don't think so.

01-12-2017 Group: 6 (Game) Participant: 21
Q: How was your experience with the game?
A: I think it is a good idea to... because you think about all the issues, possibilities, all your options you look at it in a different way. So, the negative and then positive comments. And with other people, to get a good idea of what is a good idea and what not.

Q: How do you think the game influenced the process?
A: I think you look more at all the options, because sometimes you have an idea and you are discussing it but you forget to look at other possibilities

Q: How do you feel about the final decision?
A: I think it is a good decision, because all the options are included in this decision. There are positive and negative comments on it, both sides were taken into account.
Q: Do you fully understand why this decision is made?
A: Yes I do, because everyone had their opportunity to give their opinion about the decision.

Q: How was the input of the different players?
A: In the beginning, you are doubting a little bit, a bit doubtful. But I think the input was overall good, everyone said something or had an opinion or gives an argument.
Q: And what about the amount of input?
A: It is a bit difficult to give more input, maybe it is because of this issue... But I think it was enough to make a decision, whit all these options.

Q: How was the discussion structured? Thus, in what way?
A: It was structured, because everyone has the opportunity to say something about it and to give their opinion.
Q: How was the communication in the group?
A: I think it was good, but now none of the players was really dominant. If you are in a group and someone is a bit shy, maybe someone does not say a lot of things, more hold down. Then you all have the chance to say something.
Q: Was that related to the game you think?
A: Yes, I think it is.

Q: What did you learn during the discussion?
A: To think about all the options you have. So, in a positive and a negative way.

Q: And do you have any other comments?
A: Ehm, no.
Q: Positive or negative points of the game?
A: I think it is a good design, because you look at it in a different way. There is no tunnel vision.

01-12-2017 Group: 6 (Game) Participant: 22
Q: How was your experience with the game?
A: okay, it was fun

Q: How did the game influence the process?
A: Because you write it down, you can come back easier to some points. If you just talk about it, you forget what you said earlier. And then, some points are forgotten along the process.

Q: How do you feel about the final decision?
A: Yes, this decision was logical. It was a difficult problem, so I didn't think that we would solve it right away. But it contained a lot of aspects, different aspects of the problem were included.
Q: Did you fully understand why this decision is made?
A: Yes, it was a bit obvious. The overview was very clear, everything was included.

Q: How was the input of the different players?
A: The same, if you look at colours it is about even.
Q: And what about the quality of the input?
A: Also the same, we talked with each other during someone's turn so, even when had his turn we kind of did it together. Because brainstorming, you don't do that on your own.

Q: How was the discussion structured?
A: Good. Because of the turns it was very structured and clear. And because one person had his turn, that person could talk freely, nobody would interrupt. That made the structure clear
Q: How was the communication in the group?
A: Also okay, maybe that is also because we know each other.
Q: What did you learn?
A: Yes, that writing down what you talk about during brainstorming is important. I had brainstorms before in my study that sometimes we don't write it down things get lost in discussion. This is a good way to keep track of the ideas. And the fact the negative arguments are only used during the second round also helps. Because one problem I always have with brainstorming is that you turn down ideas to fast, so in the first round. And now it didn't so that helped

Q: Do you have any other comments?
A: It worked really good, but I don't know if I would have used this in projects. Because maybe because you call it a game it sounds kind of childish. But it works really good

01-12-2017 Group: 6 (Game) Participant: 23
Q: How was your experience with the game?
A: I thought it was a pretty fun game to do, it wasn't very hard. I noticed that I really…, especially at the latest part, that I was tended to do more negative parts than positive parts. But I think that is because that is easier. At one point, I had difficulty in the first with coming up with ideas instead of... It was easier for me to come up with positions than to come up with issues.

Q: How do you think the game did influence the process?
A: Especially when people started to put their cards of excellent and good at some part I was tended to do... I am just going to put my cards there as well. It was because I agreed with them, but also because it would be easier for the progress of the game that I just agreed. In that way, it influenced it a bit.
Q: How do you feel about the final decision?
A: I agree with it. I think it's a good decision. It was the most logical decision for us. I'm, fine with it
Q: Did you fully understand why this decision is made?
A: Yes, because I think it was the most logical. It had the most positive points to it and least negative points. It was all clear

Q: How was the input of the different players?
A: I think we were all pretty similar, as to how much everyone did and said. There was no real leader, we all just did our thing. That is maybe also because the atmosphere was very relaxed. We all knew each other, so that made it easier
Q: And what about the quality of the input?
A: That was fine. Of course some were more deep than the other, but I think it was... the ideas were pretty plausible. not just random stuff

Q: How was the discussion structured?
A: Do you mean overall in the game or at one point...?
Q: maybe if you compare this to a 'normal', another discussion. When you are not in this situation,

A: I think it was easier for us to really have those cards, because then you have: "I want a plus argument" or "I want a negative argument" and that made it easier to have an overview, I guess. I think in another situation; the discussion could be more all over the place and now you have a view of what is happening and that made it easier
Q: How was the communication in the group?
A: It was fine, it was pleasant and it was easy, because we knew each other. I think we listened well to each other

Q: What did you learn?
A: Well, I have learned some new ideas about the placement of bicycles. I didn't really learn any skills, or anything like that. But I got so many information about what the problem exactly is. And maybe also about how serious the problem really is. When you're talking about it, it's more… It really is a problem, you don't really think about it when you just put your bike somewhere, but if you are in a discussion like this it hen becomes more clear, you see more views on it.

Q: Do you have any other comments? Positive comments, negative comments or something else?
A: I really liked the idea with the cards, that made it very fun to do.

01-12-2017 Group: 6 (Game) Participant: 24
Q: How was your experience with the game?
A: I liked the game and I liked the interaction. And I think it was a good point that due to the interaction I got a lot of ideas. So, it was fine
Q: How did the game influence the process?
A: The process became a little bit staccato and if you got stuck we got to help each other. I think it should be a quicker game, to increase the process.

Q: How do you feel about the final decision?
A: I liked the final decision. The final decision was a consensus and everybody got to say what they want and what they liked. So I think everybody was happy with the result.
Q: And id you fully understand why this decision is made?
A: Yes I do, but I think that if we had made a different decision, in maybe the first step or the second step of the game the outcome would be very different.

Q: How was the input of the different players?
A: The input was very varied. Together we got a nice overview of the problem. So I think the input of the different players was good
Q: And what about the amount of the input of the different players?
A: I think every player had an equal input. Maybe not in the amount of cards, but in the amount of thinking I suppose the input was equal.

Q: How was the discussion structured?
A: The discussion was well structured, because every player had his own time to speak and to speak and to fill in the cards. But there was also interaction between the different player. So everybody had input during the whole game
Q: How was the communication between the players?
A: The communication was open and people listened to each other. And together all their different ideas became real.
Q: And what did you learn while playing the game?
A: I learned that every player has its own view on the problem, but you need all those views to come to the right decision together

Q: And do you have any other comments? Negative points, positive points or something else?
A: maybe the game would be more interactive, if you just got thirty seconds to do your things on the board and then the next player got the turn. I think... But on the other hand the interaction between the different players during one turn would be less, and the interaction during the turns is important.

04-12-2017 Group: 7 (Game) Participant: 25
Q: How was your experience with the game?
A: I found the experience quite fun, quite sociable. Also, one of the main advantages was that everyone had to think for themselves to make some contributions during their turn. The only thing is during some periods during the game, some people were, I think, some people experienced a bit pressure and then other people joined in for their turn. That is of course good to help them, but that also still negatively affects their own contribution to the game. So, the turn system I think is good, but should be enforced a little bit more, but I am not sure if that still contributes to thinking together. Not sure about that, but that might be something to look into.

Q: How did the game influence the process?
A: I think it made it relatively easy... it gave an overview of the entire problem. It made... something that would normally, like in a work seminary would be more of a task, made fun. And we really worked together in a fun way, in my experience it didn't really cost any effort to get to the decision.
Q: How do you feel about the final decision?
A: I think it... we worked towards this one decision, I think it's good, in the end we did make a decision. But also, because we worked towards one decision, I think we might have must some of the smaller possible solution, we could have also integrated. Probably some things were missed. This one solution might also be more several smaller solutions, one main and maybe a few minor solutions.
Q: Do you fully understand why this decision is made?
A: You mean like in the group process?
Q: Yes, from the process, like from all the arguments and everything that this was the final decision.
A: Yes, I would find this the more natural way to come to a well-thought-out solution

Q: And what do you think of the input of the different players?
A: That really differed across players. At some point, I noticed that one player was really taking the lead. At some points this is beneficial of course, then people might feel supported. But on other times I thought it was not actually benefitting the two other players there, in speaking their minds. They were a bit overruled, by certainty and drive.
Q: What do you think about the amount of their input?
A: Also differed, I think that was mainly through the group processes. It differed, I think the game offers some good solutions to have everyone participate, but also needs some rules of enforcement. A bit more so everyone can contribute more equally.

Q: How was the discussion structured?
A: Maybe around the cards that were on the table. Less around peoples own ideas and mainly on the arguments and issues and positions we had on the table.
Q: Do you mean that the explanation sometimes missed?
A: No, I mean that sometimes when you have a discussion people tend to want to enforce their own ideas, and you got into more serious one versus one discussions. Whereas here we focused more on the ideas we had an not on specific individual ideas. Does that make sense?
Q: Yes, but how do you feel about that? Was it good, was it bad?
A: I think this was good for the process. Less emotional argumentation and more objective.
Q: How was the communication in the group?
A: It was fine, but like I explained, at some times it was a little bit one-sided

Q: What did you learn while playing the game?
A: I think I learned a fun way of tackling certain issues that we want to discuss, for one discuss in an objective manner and then secondly, come to a real conclusion in the end. It really forces you to come make a conclusion in the end. So, I think I learned a new way to tackle certain problems.

Q: And do you have any other comments? Some good points, bad points, something else?
A: No

04-12-2017 Group: 7 (Game) Participant: 26
Q: How was your experience with the game?

A: It was fun to do. I didn't know what to expect, but I think it is a good way to see what people think and how they come up with ideas the positions etc.
Q: How did the game influence the process?
A: I think you have more of an overview of all the issues and positions. If you don't have the game you have to do everything by head and discussions, and then you might forget important points. So, I think that's the main part, but overall, I don't think the way that people think will changes because of the game.
Q: How do you feel about the final decision?
A: I think it was a good decision. I mean we came up with some sort of combination of different things, but I think that's a big problem, because well if you didn't have the game the solution will probably a combination as well. So, I think we did a good job.

Q: Did you fully understand why this decision is made? How you got to this decision?
A: Yes, I think we gave lot of arguments for every point. So that we could make a clear decision, that everyone was in agreement with.
Q: How was the input of the different players?
A: What do you mean with that?
Q: Like how much input and what kind of input...
A: I think the beginning was a bit difficult, because everyone had to think of where to start. But one player gave some good arguments, he was really into the discussion I think once we had something, the ideas came. In the end, I said something that was supposed to be said in the beginning. But when you start with a subject you don't know exactly what you are going to talk about so in the end everyone got some pretty nice ideas.
Q: And there were time limits...
A: Yes, we could have discussed for hours on this issue haha
Q: And what about the amount of the input?
A: Could have been a bit more, I think, but I thought for myself that I just didn't know something because of limited time. But overall it was okay. This one player gave enough input.
Q: How was the discussion structured?
A: Sometimes it was, sometimes it wasn't. I mean in the beginning it was kind of structured but once the ideas started flowing, everyone was just giving random new ideas instead of sticking with one argument and trying to work that out. But it was disturbing, or so, so it was okay.
Q: I noticed your turns were a bit 'freely'
A: Yes, it could have been more to-the-point, but in the beginning you don't know exactly what you expect. But the positions could have been more to the point.
Q: How was the communication in the group?
A: I think it went okay, nothing special I think.

Q: What did you learn while playing the game?
A: Yes, normally in argumentation, you don't really think about the issue, position, arguments. You just start discussing all kind of stuff. So, I guess it is more organised. I kind of learned how you can do that in a real discussion. Just sticking more to the point.

Q: Do you have any other comments? Good point, negative points, something else?
A: No, I think it is a nice way and a game is always more fun than just letting people talk in a random discussion. Because, then I think it is very hard to come up with something. I mean, with the game it sort of like 'breaking the ice'. And yes, I had no idea of what I was expecting, so I think it's nice.

04-12-2017 Group: 7 (Game) Participant: 27
Q: How was your experience with the game?
A: It was a nice game and you have to think and to discuss with each other to get to the solution.
Q: How did the game influence the process?
A: I think that for the structure, the game had an influence, but not for the rest, I think so. Because you are thinking of what you can play on the board, that gave structure.
Q: How do you feel about the final decision?
A: I think that it is a good decision. It is a good solution of the problem.
Q: Did you fully understand why this decision is made?
A: Yes, it was clear to me.
Q: How was the input of the different players?

A: Every player is different, so every player has other input. But I think that everyone had input, some more than others.

Q: How was the discussion structured?
A: I think it was good. We had a not a lot of discussion, I think it was good. There was a clear structure.

Q: How was the communication in the group?
A: I think it was good. It went normal.
Q: Maybe an influence by the game or not?
A: No, I think normal as always?
Q: Did you learn something while playing the game?
A: Yes, you are thinking in another way then you do without the game I think. To get solutions of the problem... that the game is a good way to get a solution

Q: Do you have any other comments? Good points or bad points?
A: The time was a little bit short maybe. I think it is a good game...

04-12-2017 Group: 7 (Game) Participant: 28
Q: How was your experience with the game?
A: I think it was interesting and also fun to do. It was a different way than usually to discuss certain subjects, the bicycle placement. But I think it might be a useful way, or helpful way to come to a decision in a structured manner.

Q: How did the game influence the process?
A: Maybe it influenced it by giving us the chance to pick a few topics, but then we maybe we kind of thought that we were limited to those topics. So, we didn't think 'out of the box'. And we had some topics, some positions that were kind of overlapping. And, so I think maybe it was us, but we didn't use it in the best way. Sometimes it was a bit messy.
Q: So, there was a structure, but sometimes it limited the options?
A: Yes, the thinking process. There were two issues and they had some parts that were overlapping. So those parts could be put together. But we were stuck with the cards. And some arguments and the positions didn't fit with the other issue. So, it was kind of overlapping, but you couldn't put them together.

Q: How do you feel about the final decision?
A: I think that we made quite a good decision. I think everyone agreed on it. But it was maybe a simple solution because you can think very futuristic, with many technical applications. But I think with the bike light [indicating], that is kind of futuristic. But for the rest it was more of a solution for the next two three years. So, I think it's a good start, but I don't think it is 'the' solution
Q: Did you fully understand why this decision is made in the end?
A: Yes, I think it was the most obvious outcome. Because the other positions they were okay and they might help, but we had all kind of arguments to object those positions. So, I think that our final results from what we did the best solution.
Q: How was the input of the different players?
A: It was difficult, I think, for everyone in their own turn to think of something. But we really helped each other and by discussing about it, I think it is not just one person that had input and wrote it down and then the next person. But we made all the ideas together. I liked that idea.
Q: And what about the quality of the input?
A: Some input was very good, sometimes it was really obvious. Like more bicycle parking space equals more bikes can be parked. Really obvious, but it is a good point.

Q: How was the discussion with the group structured?
A: I think it was... Maybe I spoke before it was my turn sometimes, but it was overall quite structured with one person is talking and everyone is waiting and they can respond and then the next person talks and everyone is quiet and listens and agrees or disagrees. Everyone could say what they wanted to say.

Q: How was the communication in the group?

A: I think it was quite okay. It was a bit laughing, when we did not know what to do. But overall it was good, it could be better of course, everything could be better. It was good.
Q What did you learn while playing the game?
A: I think I learned a new way of making a decision, maybe that sounds a bit vague, but It is more structured than the way I usually think. So maybe that is something I can take with me in future thinking processes and discussions.

Q: And do you have any other comments? Good points, bad points, something else?
A: I think it was a fun way, also with the cards and it was quite structured with the big map. So that is a pro. And... I can't really think of bad points right now.

06-12-2017Group: 8 (No Game) Participant: 29
Q: How was your experience with the decision-task?
A: It was pretty good, because you described like the steps that we go through pretty good in the beginning so we knew what to do. What to work with and it was like pretty actual the topic. Because we, like have this problem every day. So, it was pretty nice to actually think about a new… possible solutions for the problem

Q: How do you think the explanation influenced the process? The explanation that I gave.
A: Well, you just told us what to do in the beginning. So that we have to think about stuff, like brainstorming, think about solutions. I don't think that it really influenced our thoughts, just guided them through the experience [process]

Q: How do you feel about the final decision?
A: It is actually pretty good. It depends on four main decisions [positions] or solutions we made. And they all go hand in hand, I would say. So, there is not this one big solutions that you could choose to actually solve the problem. You have to have like more little ones to actually come to a larger one

Q: Did you fully understand why this decision was made with the group?
A: Yes, I would say we chose this decision because this is the most… the best to actually realize. Because we had other ideas that were not easy to realize. They were too expensive or took a lot of time. The decisions we chose are actually less expensive and better to realize.

Q: How was the input of the different players?
A: I think that we all had ideas and one of us wrote it down, but I think that we… We also discussed our ideas, somewhere like, we didn't agree with every step, with every idea. But I think the final idea is how we all thought about the problem.

Q: How was the discussion structured?
A: First, we had to brainstorm what possible solutions we could have and then we had to evaluate what the best ones would be, like positive, negative aspects. And in the end we had to order our final decision, or make a final decision out of that
Q: So it was structured?
A: Yes, it was structured

Q: How was the communication in the group?
A: Like I said, we talked about everything, about every argument. And we mentioned pro and contra arguments and we talked about it and I guess we came to a final solution that we all agree with.

Q: What did you learn?
A: Well I learned that you have to take into account what the other people think about different topics, solutions. And you have to compromise to get to a final decision. And then, everybody has a different idea about different problem-solving. But as a group you have to, like I said, to find this one solution that fits best for all of you.

Q: Do you have any other comments? Good, negative points or something else?
A: All in all, I liked the experience, it was short but not too short and not to0 long. So, it was still interesting to work on it. I liked the idea, like I said it is an everyday problem. You never think about it in this way

06-12-2017 Group: 8 (No Game) Participant: 30
Q: How was your experience with the decision-task?
A: Good, I guess. It was kind of hard in the beginning. But once we got to like talking it got easier

Q: How do you think that the explanation I gave at the beginning influenced the process?
A: I was kind of confused at some point, because you were talking about a game, but we weren't playing a game. So, I thought I'm just going along with this and that worked out. But isn't it always like that once you get started it just kind of falls into place.

Q: How do you feel about the final decision?
A: I found it very hard to actually came up with some solutions, because how can you improve something that is not really in your hands? It's just so not… like you can grab it, kind of, so huge. But I liked our final decision, a lot of good points, different aspects as well. So, I think it could work somehow, it needs improvement of course

Q: Did you understand why this decision is made at the end? How this discussion leaded to this decision?
A: I don't know, cause we all came up with some different thoughts. And then we all mixed them together. I think it was good also that we talked about the different arguments and said something, and then it made sense that we came to that solution, instead of just going from here to like... somewhere.

Q: How was the input of the different players?
A: It was good, we kind of all said equally much. No one was that quiet or that kind of a leader, so…

Q: How was the discussion structured?
A: Yes of course, first we came up with solutions, then we had arguments for and against it and then we made a decision on whether we wanted it or not. Even though that was not based on that many arguments, that was just… thinking logically

Q: How was the communication in the group?
A: Yes, as soon as we got started it was going better every minute. I liked that

Q: What did you learn?
A: Actually, that it's good to think about the pro and cons of something and then you can make a decision and not just rush into something

Q: Do you have any other comments?
A: I think it was kind of good, because you explained it really well and then you just let us talk, but you also gave input [helping with words]. So yeah, I think it was good.

06-12-2017 Group: 8 (No Game) Participant: 31
Q: How was your experience with the decision-task?
A: So, in the beginning I think we were all a little bit confused… we just talked about it outside, because it is not a big problem but I think it is hard to find a solution for it. So, it was good that we did the brainstorming part for us to come up with some ideas. But it was like hard to find a start

Q: How did the explanation, I gave at the beginning, influence the process?
A: So, I think it influenced it positively, because you had separate parts. So, we started with the brainstorming, then the argumentation and the evaluation. I think that's good to first come up with some ideas and, just in the end like decide which one is the best option. And I think that is a good process to find a solution together.

Q: How do you feel about the final decision?
A: I think that's a good one. I mean I think it's the best option that's like… that you can realize quickly and that's not too expensive. I think that's good.

Q: Do you fully understand why this decision is made?

A: Yeah, I think so. What exactly do you mean>>Q: That you understand all the arguments and everything that leaded to the decision
A: Oh, Yes I do

Q: How was the input of the different players?
A: Very diverse. I think everyone participated good and gave something find a solution. So, the different ideas were very different I think. So, I mean someone said like a Parkhouse or just signs, so we had a lot of options to choose from to find a solution
Q: And how was the amount of input from the different players?
A: Like who said more and who said less? I think it was equal this time

Q: How was the discussion structured?
A: Do you mean in the end?
Q: No, the whole process of discussion
A: Yeah, I think like the same that I said in the beginning that we started with the brainstorming, so we came up with a few ideas and then we argued about what is easy to realize and what is too expensive. And then, in the end we made the final decision
Q: So the rounds gave the structure?
A: Yes right, what you said to us how we could do it was the structure.

Q: How was the communication in the group?
A: Good, but I think probably what we said already. That it's good when you know each other. It is probably when you don't know the other group members, it's probably a little bit hard to warm up in the beginning. But yeah it was good.

Q: Did you learn something during this task?
A: Yeah sure, I learned that it helps to discuss issues with different people, because everyone has different ideas. And that's probably good to find a solution or to… you have the chance to think about lot of options to find a good solution.

Q: Do you have any other comments? Good or negative points?
A: No, not really.

06-12-2017 Group: 8 (No Game) Participant: 32
Q: How was your experience with the decision-task?
A: I think it was quite cool. It was a very homogeneous group, so everyone let the other speak out and respected the opinion of the others. So, I think it was quite cool.

Q: How, do you think, the explanation influenced the process?
A: I think it gave it more structure. So, when you are normally discussing you are also giving arguments for the things you point out and there, at first we collected the different ideas and then we evaluated them, and then we gave the arguments for the points that we sorted out. And this was the thing that influenced your explanation.

Q: How do you feel about the final decision?
A: I think it was a good decision. So, you can easily make this decision and it is not expensive you can realize it and I think will solve the problem, but it will take some time

Q: Did you fully understand why this decision is made?
A: I just think we sorted out the pros and cons for every argument we gave and then just looked back at the arguments we gave and then sort out the best decision we made. And that was the reason

Q: How was the input of the different players?
A: I think we gave, all of us gave very different input. Everyone had a different idea, and when someone didn't know something to say the other ones know something to say. I think it really improved the whole group process and the decision process.
Q: And what about the amount of input of the different players?

A: I think it was very equally spread, so everyone said the same amount of information. And no one was like always silent and didn't say anything at all or was too shy to say anything or other persons were too dominant. I think it was very equal.

Q: How was the discussion structured?
A: I think everyone gave an idea and then sometimes they also gave pros and cons in the idea part. But later on, the ideas were just collected and written down and when an idea was really not realizable they said: "okay we just sort it out", and when we knew you could realize it we wrote it down.

Q: How was the communication in the group?
A: I think it was good, because we knew each other. So, it's very easy to communicate. So, everyone respects each other, no one was afraid to say what they really think, or embarrassed, maybe, to say something.

Q: What did you learn?
A: I think, how I could structure an argumentation and… decision-searching so, not that I come up with an idea and then argument it and maybe just sort out the negative arguments and then just erase the ideas. So, first collect different ideas and look back at all the ideas and then argument on each task. So, I collect some positive arguments for a task that I would've just argument negative before when I don't have all the other choices
Q: So, you look a little bit further then?
A: yes

Q: Do you have any other comments? Good, bad points? Something else?
A: I think it was quite good. It was well explained. It was a small group. I think it is better to do it with four people then do with six or seven. So, everyone get the chance to really speak up and give his or her ideas.

07-12-2017group: 9 (No Game) Participant: 33

Q: How was your experience with the decision-task?
A: I really liked it. The girls were nice and friendly. We had creative ideas, so I was also motivated to participate and work for a solution

Q: how did the explanation influence the process?
A: Well, I had an idea of what is going to be the next step, and I had a more structured view of the whole thing then when I didn't receive the instruction before.

Q: How do you feel about the final decision?
A: I think I am not so satisfied with it, because it is a problem that is difficult to tackle. But I think it is the best we can do, like for half an hour of discussion and in the limit of our 'limitations'

Q: Did you fully understand why this decision is made?
A: It's difficult… I do understand it, I can relate it. I personally would have done something else, but it's like… I think I wouldn't have a better option. I don't think that my option is better than the groups option. But still it is not satisfying.

Q: How was the input of the different players?
A: Positive, they are all constructive and helpful and also build on the ideas of another. So that is especially helpful.
Q: And what about the amount?
A: I think there's a limit of what you can bring into this task, but in those limits it was fully satisfying how much everybody put into.

Q: How was the discussion structured?
A: Yes, sometimes we spoke when someone else spoke, because we had different ideas in de second [round]. But I think everyone respected that the other had to finish to talk first and then say the point and wait for another. I think everyone was polite.

Q: How was the communication in the group?

A: Yes positive. I think no one was angry and we laughed a lot, that was nice. I felt like I can say everything I want to say and no one is judging me or something. So, the situation and feeling was nice from talking to the others

Q: What did you learn?
A: yes, I think you can always learn something when working with other people. And, I do this in my study too, we have the ASCE model and thinking about solutions. So, it's nothing new to me, but the more training you get, the more constructive it is the next time

Q: Any other comments?
A: It was a bit abstract to be in the control group. But that is the point of a control group. I think maybe it would be a different experience with cards and so on.. but, it's hard to imagine. And I think we did get along too. I really liked the study.

07-12-2017 Group: 9 (No Game) Participant: 34
Q: How was your experience with the decision-task?
A: Well I think in the beginning it was quite hard to find a solution, but after a while it went okay.

Q: how did the explanation influence the process? If you compared it to an other discussion?
A: I think it made it easier to maintain a structure, during the discussion.

Q: How do you feel about the final decision?
A: I agreed with the decision, I think it was the best solution. But maybe not he cheapest. It depends what factors will depend the final solution.

Q: Did you understand why this decision is made?
A: I think it was the easiest solution we came up with. Like we also talked about combining the other solutions. This was like one concrete solution.

Q: How was the input of the different players?
A: I think everyone had like the same amount of input in the different solutions
Q: And what about the quality of the input?
A: I think we just don't know that much about it, that's why it's… for me at least, like I don't go to the university by bike. So, I don't know about the different parking spots. But I think in general it was good.

Q: How was the discussion structured?
A: Yes, it was okay I think. Because we knew the structure of like the arguments and the evaluation. Yes, I think it was just hard to start… of where to begin, or come up with solutions.

Q: How was the communication in the group?
A: I think it was good.

Q: What did you learn?
A: Yes, maybe about the structure of discussion. Like where to start and what to follow.

Q: And do you have any other comments?
A: No.

07-12-2017 Group: 9 (No Game) Participant: 35
Q: How was your experience with the decision-task?
A: Good. Yes, we just talked outside, I'm not sure what you are observing, but I think it was really hard. Like we didn't even know each other and everyone was not really sure of what was expected. And I think this was really hard, to argument and to decide something.

Q: How do you think that the explanation influenced the process?

A: To be honest, I never did an argumentation before, like we didn't do it yet or never did it. Like kind of, but not like proper, like I didn't learn how to do it. And I think it was good because we had like a kind of a… somewhere we could look, we knew a little bit of what to do. We could check, okay we have to check, we have to sort out the problem now, we have to argument now, we have to evaluate this now. I think it was useful to get like this and not to do whatever you like. We wouldn't know that much what we had to do.

Q: How do you feel about the final decision?
A: I am not very satisfied, because what maybe just is like a personal thing. I don't think we thought very deeply about this stuff, we didn't think about the problem, we didn't think about the solution. We don't have any background knowledge, this is our own thoughts, we are not experts in this. And I think it is very hard to make a good solution when you don't have any problem… background knowledge, or anything what actually could be done. I think it's very vague, the decision, the ultimate decision. Because we were like: "Oh this is good, okay". But not really thinking.

Q: Did you fully understand why this decision was made?
A: I think because we wrote down all the pros and cons, or maybe more the cons… We just thought, I don't know, we really couldn't figure out what would be the best. To be honest I don't really know how was the end… How we came to the decision, because we didn't really discuss in the end like… I think, I, we first thought this one [points] and then I said maybe the underground, and the others didn't say anything to it. So, then everybody was like okay, fine… nobody did say anything against it. This was a little bit vague, and I think other people just followed.

Q: How was the input of the different players?
A: Like the other people? Yeah good, I think everybody was working together, everybody had ideas. And I think people said something I wouldn't think of.
Q: And what about the amount of input of each player?
A: I think, maybe… Because, I don't like when everything is quiet or when everything is awkward. So, I often do stuff then, because I hate this feeling and then I just try to organise and try to do, and maybe that's the reason, because I'm [??] Maybe I did like, not the most, but I think I was one of the ones who was more like leading. Just not because I want to but… I had the feeling that I had to, because I was like… I just hate when it is super awkward and everyone is silent. I just hate it. And I think the others were quite all right with it.
Q: So, there was a difference, but it was not a problem?
A: No, it was not a problem I think. I think still everybody thought and did the same amount in the end. Like from effort, I think, if you know what I mean…

Q: How was the discussion structured?
A: Well actually you gave us the structure, I think. Because you said, okay let's discuss the problem, lets discuss this, now argument, and now evaluate and now give a final decision. I think, we didn't have a lot of things that we did ourselves there, like you just said, but I… yeah content-wise… I think we just don't know a lot of things, there is nothing to improve. We just think about the problem, okay we got a little bit creative, we came up with something, but it was not like… I don't know… But there was not like an improvement or…
Q: So, you just followed the instructions?
A: yes.

Q: How was the communication in the group?
A: I think, it's just because nobody knew each other and nobody… didn't know what to do and what to expect. So, everybody, was in the beginning like... not confused... maybe like quiet. But I think, it is like usually like this. I think, still in the end, people were afraid to say certain stuff, so I think throughout the whole thing, they thought something, but didn't say something against you. But I think in general it was good, everyone was respecting each other and tried to get involved with each other. I think… Maybe it was not very involved, maybe everyone was saying their thoughts, but not very… Or maybe, sorry… I think it was just because people were afraid of something or I don't know, so they kept very low. I don't know. There was not enough time to, like warm up, I think, for everyone.

Q: What did you learn?
A: I learned from myself, that I maybe should go more… maybe let more the other people, maybe ask: "what

do you think?" or like "would it be like this?". I don't know, maybe. I don't know. Maybe I think I should take myself back, like let the others do, but then I don't like when nobody is doing this… but I'm not sure…
Q: Maybe something to think about, I don't think there is a right or wrong with this…
A: Maybe involve the people. My problem is that when I have an idea, I have to pop it out and talk over people. And sometimes I am like I should have stayed quiet. And often then I apologize, but still sometimes shouldn't interrupt people.

Q: Do you have any other comments? Good points, negative points, something else?
A: I think it was good. I don't know if this was part of your study, but everyone felt very unprepared and… What is expected and what should we do, it was very crazy, But maybe it was supposed to be like this, I don't know.
Q: not really…
A: Oh really? Okay… And it kind of confused me with the game thing. Why is the game here when we don't do it? And I was a bit disappointed, like I wanted to play the game. Yes, I think we didn't really know, and maybe… I think it is good, especially because you said discuss about this and we didn't have any background. Everyone was like should we really discuss… It was like, "out of the blue". And of course, it is not possible to get to know each other but. But because everybody was still like in this awkward stage it was hard to discuss this. When you know each other, you are not afraid to say something

07-12-2017 Group: 9 (No Game) Participant: 36
Q: How was your experience with the decision-task?
A: I think it was first a little bit difficult, because we didn't know each other. Then it is always a little bit you don't know what you can say or cannot. And the task was also difficult. I didn't have that much ideas of what we could change about the bikes. But, I think in the beginning it was a little bit difficult, but later it got better, I think.

Q: how did the explanation influence the process?
A: I think we tried to manage the task like you told us with the arguments and everything. And then, we really tried to find arguments and maybe we left other possible solutions a little bit outside, because we focused on that one we first brainstormed
Q: Like in the second round you came up with new solutions?
A: yes.

Q: How do you feel about the final decision?
A: I don't know if that's the best idea, it is really difficult the task. I think there are not that much possibilities and we don't know about that much possibilities and then it's difficult to find the perfect one. In general, the final solution was the underground parking, and I think in general it is a good solution. But, like I said, we don't know if it's a possible, like if it's too expensive, or I don't have knowledge about it…

Q: Do you fully understand why this decision is made?
A: I think I was a little bit surprised, because first we all discussed every solution and then one person said: "let's take that one" and another said: 'let's take that one'. And then, I think, in the end we agreed on one, but then the underground-parking was another and then we took this. I don't know, I was a little bit confused

Q: How was the input of the different players?
A: I think it's always the case that some say a little bit more, giving a little bit more input. But I think the four of us was relatively the same. So, some people talk a little bit less maybe.
Q: And what about the quality of the input?
A: I think it was good, because we really thought about possible solutions. But we were a little bit limited and sometimes we didn't know what to say and we had no more ideas.

Q: How was the discussion structured?
A: First, we made us aware of the problem, what it is exactly and then we came up with a little bit more than one, in general of what the whole problem was and why... And then, we tried to find solutions. And I think then we found arguments for and against different solutions. Then we decided on one thing, or we tried at least…

Q: How was the communication in the group?

A: I also think it was a little bit difficult, because like I said we didn't knew each other and when that's always a little bit more… with distance when we talk to each other. Because that… we didn't talk that much.

Q: What did you learn?
A: I think maybe, like always in discussion, because I think I'm a little more of a quiet person and I always try to give more input then I normally do. And I think I did that today too, or at least I tried. Yes and of course, just thinking about problems like that, because we all know that there are not enough spaces and now we know it could be possible to find a solution

Q: Any other comments? Maybe good points or negative points, or something else
A: on the discussion or the game?
Q: On everything…
A: I think we had, we needed a little bit more time maybe. But it was also difficult, because we didn't come up with that much ideas. But maybe if we had a little bit more time we…
Maybe if we discussed more talked more to each other, maybe asked the opinion of somebody else, maybe we would get to a better solution.

13-12-2017 Group: 10 (No Game) Participant: 37
Q: How was your experience with the decision-task?
A: I think I was positively surprised. Because at first you are just like okay I don't really know what to think of it and what to imagine. And you get this problem, and you kind of like oh I never thought about this, so what is going on. How should I put this, because I never really thought of designs. I just leave it to the persons who do this. Actually, it was kind of fun, to think about it. Because it is a problem that also affects me, because I always ride my bike here and sometimes it's really bad to find a place. So, to think of a solution yourself and maybe you come to terms that maybe it's not so easy to snip your finger, and find a solution… So, maybe also gives more tolerance to the university for it. That sometimes there are problems and sometimes there are things that are not so well organised, but I think that you understand now, why that is because you can't just solve every problem with just one idea. It is really hard, challenging

Q: How did the explanation influence the process?
A: I think it organised it really well, because normally when you are like have this problem and want to find a solution. You already think of positions and already are like "Oh no, I don't think this is well because of blablabla". And when you think of positions, you already think of arguments. So, I think it is kind of a good way to first think only of positions, so you have a large range of positions you can choose from and then think about arguments. So, maybe it keeps a clearer picture, because if you can look at it like this [points], like in this table it gets a lot easier, maybe, to combine and make decisions then to think of the positions and already are like oh let's erase that because of these and these arguments. So, you have a lot more possibilities.

Q: How do you feel about the final decision?
A: I'm actually kind of proud, because at first I was really like "oh my god, how can you solve this". But now, with the decision I think, this could actually be a good idea. Like I would use this.

Q: Did you understand why this decision is made?
A: yes, because maybe the first positions you think of, like 'bigger space' or 'more space between the racks', if you really think about it and look at the arguments against it, you are like maybe this is not the best decision. Maybe we have to tackle the problem from another perspective, more practical or something. And more advance with technology, because I mean this is a technical university, so maybe we could use that. It is kind of nice to combine the technical aspects into this decision, in my opinion.

Q: How was the input of the different players?
A: I think we were all really balanced, so there was not like a leader or someone who made the most positions. I think we really tried, so everybody tried to make at least one or two positions or to provide arguments. So, it was really balanced. I was happy with it, because when you work in a group, there is always the danger of somebody not working with the group or just sitting there saying nothing. I was really happy.

Q: How was the discussion structured?

A: I think, it was kind of good, because when we discussed we did go in order of our positions and just like randomly pick a position and then talk about pros and cons. It was a little bit organised and that is wat made it easier, because it wasn't so confusing to skip from one to seven to four, but it was easier to talk to and to keep track of all the points we made.
Q: and also writing down..?
A: Yes, because for me personally it is always easier to see my options and to think about solutions if I really have it on paper. Because otherwise you have to keep everything in your mind. It's kind of hard, but having it on paper helps.

Q: How was the communication in the group?
A: I think at first it was kind of, a little bit hard, like we don't know each other. Me and my friend knew each other, but we didn't know the other person. And it was how do we do this, when to say what. At the end, it was actually really good. Because I thought we are easy to work with. So, everybody put in something. Nobody wanted to be the leader… And we all tried to keep it organised and nice, the atmosphere.

Q: What did you learn?
A: Yes, I think so. I think if I make a decision next time, I would use this way of first thinking of positions then of arguments and then looking… Because up until now I always made decision with my stomach, like I just do this and afterwards I think maybe this wasn't the right decision, so I think this is a good advanced way to make decisions, so you can be happy with them

Q: Do you have any other comments?
A: Actually no, there was nothing negative really. I really liked it.

13-12-2017 Group: 10 (No Game) Participant: 38
Q: How was your experience with the decision-task?
A: Well, it's similar to what we have to do in the project work. So, it is, I'm used to it. But, since we have no, really background in this topic, it was at first a little bit hard to come up with ideas, like in which direction we had to go. Like we had some times when no one spoke. And then from like the process like from our first ideas to like the solution thinking, thinking back it was quite a jump. And from the arguments pro and con and which arguments you want to take, it was from time to time a little bit hard, but it was okay.

Q: How did the explanation influence the process?
A: I think yes, the task did. Especially like the division in like four steps, that influenced it. Because we had more a systematic approach. Otherwise it would have been more like, not chaotic, more free-style kind of. We would start with already ideas and like put out ideas that we think are not suitable from the beginning but maybe later on could have […] them. And I think that maybe it influenced, like you didn't introduce the game, but that influenced our decision-making

Q: How do you feel about the final decision?
A: I'm satisfied. It is probably… I'm not sure if it is really applicable to this situation. But from the minimal knowledge we have about designing a bike rack it wasn't that bad.

Q: Did you understand why this decision is made?
A: Yes, especially because we had like this systematic approach we can look back at our [positions] and the pros and cons. And then we had like the stage where we took one [position] and put it together to like to outweigh the con and make it more efficient. So, I think it was quite clear why we came to this decision.

Q: How was the input of the different players?
A: I think it was pretty divided. Everyone had like some ideas and brought something in, so I think it was quite equal. There were different ideas. Of course, some are more prone to their arguments that they come up with so they have a lot to talk about. That's natural, but in general it was pretty equal divided

Q: How was the discussion structured?
A: At first, I think it was not really clear what we had to do. So, it was not really, just like coming up with ideas, but also already evaluating thought ideas, and after we got more into it, we kind of could divide the work like

when arguments are needed we could talk about arguments but we already like in the third step. So, it was not clear structured, but it worked out in the end.

Q: How was the communication in the group?
A: At first we, like I already said, there were some [??]. And we had to get more used to each other. I mean they knew each other, but I didn't. And so, especially like coming up with ideas, it is quite hard to just put something in there and then we didn't talk that much. But I think later on we were able to communicate well. And to like listen to others and bring out ideas and add some things or say that this didn't work or… So the communication in the end was pretty good.

Q: What did you learn?
A: Well I wouldn't say learn, because actually we know how to come to a decision. But it kind of reminded me to use a more systematic approach, because if I think back to the last module, on project work, it was not that systematic. We just came up with ideas and then talked and no one really wrote something down. That would, if we would have like a pro and con list that would have improved our ideas, like we just wrote it in a mind map but more systematic. And if we kind of look back from why we chose like certain aspects and later on for justifying our intervention.

Q: Do you have any other comments?
A: No, not really

13-12-2017 Group: 10 (No Game) Participant: 39
Q: How was your experience with the decision-task?
A: I think it helped to first think of all the positions and not already about arguments about it. Because sometimes you already have an idea, and you throw it away, because you think it is not good. But it helps to first think of what could we do and then about arguments.

Q: How did the explanation influence the process?
A: It definitely influenced it, because we worked with the model.

Q: How do you feel about the final decision?
A: I think we made a good decision and like that we kept track of how we came to the decision. It was very clear, and also why we didn't take other ideas. So, I think in the end the solution made sense to all of us.
Q: Did you understand why this decision is made?
A: Yes

Q: How was the input of the different players?
A: I think we all had, ideas, and all contributed to the solution. So, I think it was equally distributed.

Q: How was the discussion structured?
A: Usually… first for the positions we all mentioned our ideas, and then later when we discussed about it… I think it was more structured then in another situation, because we thought about both the pros and cons. And as I said, we didn't throw away an idea immediately, but we thought about it, why is it possible or not possible and what should be changed about that idea. And, I think, that is also why we didn't just take one of the ideas, but merged it all together and formed one idea of all the different distinct ones.

Q: How was the communication in the group?
A: Sometimes it was a bit shy, we had to get into the topic first, because it is something we didn't think about before. But, I think, later we really… were more on a flow and all had more ideas.

Q: What did you learn?
A: yes, what I will remember for my group is to first take everything that is possible and then think about the pros and cons. And not throw ideas away too early.
Q: Do you have any other comments?
A: No