PLEX Cards: A Source of Inspiration When Designing for Playfulness

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ABSTRACT

Playfulness can be observed in all areas of human activity. It is an attitude of making activities more enjoyable. Designing for playfulness involves creating objects that elicit a playful approach and provide enjoyable experiences. In this paper we introduce the design and evaluation of the *PLEX Cards* and its two related idea generation techniques. The cards were created to communicate the 22 categories of a Playful Experiences framework to designers and other stakeholders who wish to design for playfulness. We have evaluated the practical use of the cards by applying them in three design cases. The results show that the *PLEX Cards* are a valuable source of inspiration when designing for playfulness and the techniques help create a large amount of ideas in a short time.

Categories and Subject Descriptors

H.5.m [**Information Interfaces & Presentation**]: Miscellaneous.

General Terms

Design, Experimentation, Human Factors.

Keywords

Design methods, workshop, inspiration, playfulness, card.

1. INTRODUCTION

Playfulness is a broader human phenomenon than playing games. Play is deeply rooted in human culture, as proposed by pioneering anthropologist Johan Huizinga [10]. Thus, it is worthwhile to consider that most human activities, even pragmatic or mundane tasks, can be approached and experienced to some extent as a form of play.

The terms 'play' and 'game' refer to two intertwined, but still different things. Some scholars, including Frasca, use the terms 'paidia' and 'ludus' to define the difference between play and game. Frasca has adapted these two terms from the seminal work by Caillois [3] whose original intent with the terms was to distinguish between free and formal play. Paidia and ludus can be seen as the opposite ends of a broad range of activities. Ludus is

formal play with rules that define winners and losers, while paidia is a type of play that does not do this [6].

According to Fullerton et al. [7], playfulness is a state of mind rather than an action. Play can be a way of achieving new things because it allows people to look at and approach things differently. A playful approach can be applied to mundane activities or even serious subjects [7]. A playful approach involves deriving playful experiences from everyday activities and products. This definition of 'play' encompasses both ludus and paidia. Like paidia, being engaged in a playful approach may not have a clear beginning, end, and goal, and it may not even appear as a playful activity to an outside observer. A playful approach means taking on any subject matter or activity with the same attitude as in play: as something that is not serious and that does not have real-world consequences. Through this approach, people obtain *playful experiences*, in other words, experiences elicited by their playful approach to activities or how they look at the world. Obtaining these experiences may *per se* be highly motivating.

Korhonen et al. [12] have defined a Playful Experiences framework (PLEX). The framework consists of 22 Playful Experience categories. PLEX is not limited to explaining experiences obtained from ludus-type activities, but it sets out to cover the entire play continuum between paidia and ludus. The PLEX categories cover a broad spectrum of experiences, some of which seem evident in play activities (e.g. 'Challenge', 'Competition'), while others may seem surprising in this context (e.g. 'Cruelty', 'Suffering'). We set out to explore if the PLEX framework could be used to design for playfulness beyond games.

In this paper we introduce the design and evaluation of the *PLEX Cards*. We created a set of cards to clearly communicate each of the 22 PLEX framework categories and provide inspiration to designers while designing for playfulness. Additionally, we propose two idea generation techniques that make use of the cards: *PLEX Brainstorming* and *PLEX Scenario*.

The paper is structured as follows. First, we provide background information on the PLEX framework and discuss related work. Second, we introduce the design and evaluation of the four versions of the *PLEX Cards*. Third we present two idea generation techniques and the results of its three evaluations during workshops and design sprints. Finally, we provide a discussion section and conclusions.

2. PLEX FRAMEWORK

Costello and Edmonds [4] have published one of the most comprehensive theoretical frameworks of pleasurable experiences. They assembled the views of philosophers, researchers and game

designers to obtain what they call 'pleasure framework'. They derived 13 pleasure categories of play through cross-referencing six earlier publications. The 'pleasure framework' is a fruitful starting point for the study of more specific playful experiences. However, their framework may be too focused on the evaluation of pleasurable playful interfaces in interactive artworks, which is the primary purpose they developed the framework for.

To adjust and expand the framework, Korhonen et al. [12] have added the works of other researchers and designers to the pool of analyses, producing the initial version of the PLEX framework. The added body of work discusses experiences, pleasures, emotions, elements of play, and the reasons why people play. The definitions presented by Costello and Edmonds to their pleasure categories were also taken into account when defining the PLEX categories. As a result of this analysis, the authors examine the wide range of experiences elicited by interactive products when they are used in a playful manner. The overall focus was shifted from pleasures to experiences to indicate that not all such experiences are always pleasurable in the context of play. To validate the initial PLEX framework, the authors interviewed 13 players about their experiences with three videogame titles: *The Sims 2, Grand Theft Auto IV* and *Spore*. All the inspected PLEX categories were mentioned on numerous occasions in the interviews and in the context of at least two different games. The interview results indicated that the different ways in which players experience games can at least partly be explained through the PLEX categories. On basis of the findings, the authors added new categories to PLEX. In this paper we explore the use of the PLEX framework as an inspiration to design for playfulness.

Table 1. PLEX framework consisting of 22 categories.

Experience	Description
Captivation	Forgetting one's surroundings
Challenge	Testing abilities in a demanding task
Competition	Contest with oneself or an opponent
Completion	Finishing a major task, closure
Control	Dominating, commanding, regulating
Cruelty	Causing mental or physical pain
Discovery	Finding something new or unknown
Eroticism	A sexually arousing experience
Exploration	Investigating an object or situation
Expression	Manifesting oneself creatively
Fantasy	An imagined experience
Fellowship	Friendship, communality or intimacy
Humor	Fun, joy, amusement, jokes, gags
Nurture	Taking care of oneself or others
Relaxation	Relief from bodily or mental work
Sensation	Excitement by stimulating senses
Simulation	An imitation of everyday life
Submission	Being part of a larger structure
Subversion	Breaking social rules and norms
Suffering	Experience of loss, frustration, anger
Sympathy	Sharing emotional feelings
Thrill	Excitement derived from risk, danger

3. RELATED WORK
We will now discuss several card decks that have been created for two main purposes: for inspiration in design and as design games.

3.1 Design Cards
Several designers and researchers have created a first group of cards whose main purpose is to provide inspiration in user-centered design activities. Halskov and Dalsgaard's *Inspiration*

Cards [8, 9] consist of two sets of cards (i.e. technology and domain cards) that are used by designers and other stakeholders at the start of the design process to generate ideas collaboratively. The designers themselves mostly define the contents of the cards, although the stakeholders are invited to generate domain cards. The cards are combined on A3 posters to capture design concepts. Buur and Soendergaard's *Video Cards* [2] were created to allow developers to collaboratively and directly analyze bits of videos collected in field studies. Short video sequences are first digitized and then turned into playing cards. The cards are then used in the Video Card Game where the video resources are available to developers in a simple physical form. Brandt and Messeter [1] have developed four games that combine the use of three different types of cards: 1) *Moment Cards,* an RFID-based implementation of the *Video Cards,* 2) *Sign Cards,* which consist of words to create stories and provide a conceptual framework for these stories, and 3) *Trace Cards* that consist of pictures of the surroundings collected from field studies.

The *IDEO Cards* [11] consist of a deck of 51 cards, each showing a different method used by IDEO to keep people at the center of their design processes. They are meant to inspire creativity by inviting designers to try out and develop different approaches when designing. The *Personal Cardset* [21] is a documentation of the different experiences reported by end-users in generative sessions. The cards can be used to communicate the results of these sessions to designers. These A5 cards contain a combination of raw data (e.g. user's photo, name, quotes, illustrations), and researchers' interpretations (e.g. visualizations).

Our *PLEX Cards* share core aspects with the previously discussed design cards. First, the *PLEX Cards* help facilitate user-centered design activities since they are meant to be used by researchers, designers and other stakeholders involved in the design process. Second, the *PLEX Cards* were created as a rich source of inspiration for creative processes. Third, the *PLEX Cards* are a low-tech and approachable way to communicate the categories of the PLEX framework.

3.2 Design-Games Cards
A second group of card sets has been created as part of design games to support idea generation activities. Kultima et al. [13] have designed two card sets to generate ideas for mobile multiplayer games: the *VNA Cards* and the *GameSeekers Cards.* The *VNA Cards* consist of three decks of cards with one word, each deck containing verbs, nouns and adjectives. Analyzing casual and children's games helped pick the words. In this turn-based game, the first player takes one verb card, shows the card and describes what is done in the game. The second player then takes a noun and elaborates on the existing idea. The third player picks an adjective and completes the game idea by merging the three elements together. This method generates several high-level ideas in a short time frame. The *Gameseekers Cards* is a set of four different types of color-coded cards with pictures, single words, sentences and abstract forms. The game itself is played by dealing a number of cards to the players who then take turns in placing one card on the table. The game ends either when one player runs out of cards, or when all players have passed their turn without adding something new to the idea. Compared to the *VNA Cards,* the rules of this game are more complicated and the resulting ideas are large and shattered.

Two commercially available design-game cards are the *Thinkpak* and *ThinkCube*. Michalko's *Thinkpak* [16] is a brainstorming card deck with 56 cards designed to stimulate imagination, generate ideas, and later evaluate the resulting ideas. Michalko proposes a game for two or more people involved in group brainstorming. The players pick up an idea stimulator card and must come up with an idea based on that card and write it down within two minutes to avoid being disqualified. The game is over when there is only one player left and the ideas can then be evaluated. Sampanthar created *ThinkCube* [22] by looking at board games and combining game mechanics with a brainstorming card deck. The deck has 88 Idea cards describing specific ideas, 88 Word cards with the definition of a keyword and a visual thesaurus, and 24 Mutation cards with verbs to modify the Idea and Word cards. The game is played by 4-7 players who each draw 6 cards from the idea library. Each player adds one card to the table so that two or more cards can be combined together. A dedicated person writes down all the ideas from the session.

Similarly, our *PLEX Cards* incorporate simple game rules to provide a structure to the innovation process. Participants take turns in drawing cards from the deck and make combinations of categories to generate new ideas. The specific dynamics of the idea generation game are later explained in this paper.

4. DESIGNING THE PLEX CARDS

As part of the research on the PLEX framework, we wanted to explore if the categories could be used as a starting point to design for playful experiences. We conducted 3 design sprints where we used PLEX to guide design exploration. In each design sprint we used a different strategy to communicate the PLEX categories. First, we had a PowerPoint slide with the definitions of the categories that was briefly projected on the wall. Second, we printed an A0 poster with the definitions. Third, we distributed handouts of PowerPoint slides with definitions and examples of the categories. Designers and other stakeholders involved in these 3 design sprints were only able to have an overview of the categories, as it was difficult for them to understand and grasp the meaning of the PLEX framework from the different media we proposed. We needed to bring PLEX closer to people.

The creation of the *PLEX Cards* was motivated by our need to clearly communicate the different categories of the PLEX framework to allow designers to design for playful experiences. We needed a low-tech and approachable medium that would better fit in the dynamics of a design discussion. Physical cards were chosen for this matter. We will now describe the design process and evaluation of four versions of the *PLEX Cards*.

4.1 First Version

4.1.1 Design Process
The first version of the *PLEX Cards* consisted of 22 cardboard cards (Figure 1). The cards were squared (9x9 cm) and had round edges. To avoid a common physical limitation of cards [2], the front of each card had the name of the PLEX category printed at the top and bottom in different orientations so that players sitting on opposite sides of the table would be able to read the name of the card. The front also included the textual definition of the category and one image aimed at illustrating the main idea for that category. The back of the card was color-coded red to identify the version and had the name of the card deck.

Figure 1. First version of the *PLEX Cards*. The 'Expression' card with its long definition and a reference to Guitar Hero.

As the origin of the PLEX framework is set on digital games, many of the images were either directly related to videogames *(Tamagotchi, Grand Theft Auto IV, The Sims, Guitar Hero, Okami, Age of Empires)* or other types of games (strip poker, fantasy play, gambling). Other image sources were Internet applications *(Google Street View, Nokia Sports Tracker, Google Earth)* and TV shows *(24, Itchy and Scratchy, Sex and the City)*.

The content of the cards (i.e. the definition and the images) had to succinctly and unequivocally exemplify each category [8]. For this first version of the cards, we did a thorough Internet image search. The final images consisted mostly of stock images that included some existing commercially available products and a few faces of known people (e.g. Usain Bolt). These images depicted moments, places, and activities that create playful experiences.

4.1.2 Evaluation
This version of the cards was tested in the Social and Spatial Interactions workshop in fall 2009, in Tampere, Finland. A total of 8 participants used the cards in pairs to help them guide the discussion. The cards were drawn from the deck randomly, discussing one category until they felt they needed to clear the table and take a new card. Each pair went through 4-6 categories.

The findings show that the cards facilitated the process of introducing the categories to those participants who were not familiar with the cards, as some knew the PLEX framework beforehand. However, participants reported having problems relating to some categories, as they were unfamiliar with the contents of the cards. Those cards that referred to specific applications, TV series, or games-related content were difficult to understand if participants had not previously used those applications, seen those shows, or played those games. Straightforward categories such as 'Exploration' had to be explained several times during the workshops because most participants were unfamiliar with the concept of 'fog of war' commonly used in map-based digital games. The same applies for 'Captivation' and 'Challenge', where a split-screen image from the TV series *24* was used to illustrate captivation in narrative, and *Nokia Sports Tracker* was used to introduce the idea of pushing your boundaries while exercising, respectively.

Other issues with the cards were related to the definitions and misleading content. Some of the definitions were overly wordy

and circular. For example 'Fellowship', 'Competition', 'Nurture', 'Challenge', 'Control', 'Expression', 'Fantasy', 'Eroticism' and 'Relaxation' all used the term as part of the definition. Regarding the misleading content, some images created confusion as they could be linked to other categories. As an example, the image for 'Nurture' showed people meditating to suggest the nurture of oneself, which was probably better suited for 'Relaxation'.

With this first evaluation of the *PLEX Cards,* we noticed the importance of finding images that people can relate to. Halskov and Dalsgaard found with their *Inspiration Cards* [9] that when their technology cards were closer to the participants' domain of expertise, it allowed them to easily acknowledge the usefulness of the technology. However, in our case it is hard to judge beforehand what different people will be familiar with in terms of specific technologies, applications, games or TV series. Therefore, we needed to find some examples of content that would not be too specific so that most people would be able to easily identify and begin their design exploration from.

4.2 Second Version

4.2.1 Design Process
Several modifications were introduced to the second version of the *PLEX Cards* (Figure 2). The shape and size of the cards were maintained, while the back of the deck was changed to blue to reflect the version change. Out of the 22 cards, 14 definitions and 10 images were modified. The definitions were rewritten to increase clarity and to remove circular definitions.

Regarding the images, we changed the most problematic ones as people could not easily relate to them namely those that made reference to Internet applications (i.e. *Google Street View, Nokia Sports Tracker, Google Earth*), and TV shows (i.e. *24, Itchy and Scratchy*). We replaced them with examples of human activities or things people do. For example, for 'Cruelty' we replaced *The Itchy and Scratchy Show* for an image of two small girls gossiping and leaving a third one out on her own. Two Internet applications were replaced for 'Challenge' and 'Discovery' by a group of children going through a canopy walkway, and a child digging a large hole in the sand and finding something in it, respectively.

At this point we also started to introduce in the cards images that could potentially suggest actions or lead to interaction styles. For instance Figure 2 shows a pair of hands exploring a Rubik's cube. To a trained interaction designer, this may suggest twisting movements in opposite directions or rotating along the XYZ axis. Similarly, for 'Nurture' two hands were holding a small bonsai tree by the base as if it was going to be transferred from one pot to another. Again, the position of the hands and the action of carefully transferring one object from one place to another may suggest interaction techniques. 'Sympathy' and 'Thrill' also could indicate new interaction styles as they respectively depict a hug between two girls and a roulette dealer throwing the marble.

One final aspect of the card design is that we decided to remove the category name found at the top of the card to allow players on opposite sides of the table to identify the card. The reason for this was that the card had seldom been used in such an arrangement and, due to the reduced size of the card, it was also adding extra visual information to the card. We decided to have a simpler design.

Figure 2. Second version of the *PLEX Cards.* The 'Exploration' card with an image that suggests an action.

4.2.2 Evaluation
The second version of the cards was evaluated with researchers from HIIT in Espoo, Finland, in preparation for the EmoListen workshop also in fall 2009. We thought it was relevant to confront this group of people with the *PLEX Cards* as they would be using the cards later in the role of designers for idea generation. A total of 14 researchers participated in this evaluation, which were split into two smaller groups of 7. We used two decks corresponding to the first and second versions of the *PLEX Cards.* The groups exchanged the cards so they would both be exposed to the two versions. Participants first browsed the cards, and then handled them by pointing or taking a card in their hand to refer to specific aspects of the cards. They also made clusters and associations as they openly discussed their own interpretations of the material.

In general, the researchers were positive about the usefulness of the cards as they helped communicate the PLEX categories:

"(The cards are a) rich source for design inspiration. I can see this as a useful tool for concept innovation."

"These cards (make) a good card set. It made me think a lot about playfulness."

Participants also pointed out that we should not limit the contents of the cards to games. Although that had been our starting point, they told us we should rather rely on people's own experiences:

"(Having more) real-life examples might be better."

The participants reflected on the fact that the images were working on different abstraction levels. Although we had improved the deck by removing those images that people could not easily relate to because they were too specific (i.e. Internet applications or TV shows), this time participants had trouble with images they had too strong opinions about. The card for 'Competition' had an image of Usain Bolt crossing the finish line in a 100m race. Participants knew Usain Bolt's story beforehand so they said the image strongly suggested *"victory and domination"* to them, more so than competition. These findings are in line with the work of Lucero [15] and Sleeswijk and Stappers [20]. In his studies on how designers use mood boards, Lucero has found that designers tend to avoid the use of pictures of famous people in their mood boards, as clients tend to get sucked into the images and thus narrow down possible interpretations. Similarly, in their work on Personas, Sleeswijk

and Stappers have found that images of famous people come pre-packaged with messages, a set of values and norms, as well as other connotations. Finding the right image for the cards relates to finding an appropriate abstraction level for the contents. It is a delicate balance between being abstract enough, so that the content does not dictate the design, and concrete enough, so that people can relate to the content.

Participants asked us to avoid images that would be too detailed or that would over-specify the design. They proposed having some sort of booklet or using the backside of the card to reveal more abstract human experiences and then more concrete applications or uses of the PLEX category.

In this second study, we identified the risk of using images that are pre-loaded with meaning as they may narrow down the possibilities for new and unexpected interpretations. Halskov and Dalsgaard [9] have found with their *technology cards* that the larger the conceptual distance is to the domain, the greater the innovative power of the card.

4.3 Third Version

4.3.1 Design Process

The third version of the cards was the result of a major redesign (Figure 3). Based on the feedback we received from the discussion with researchers from HIIT in preparation for the EmoListen workshop, we decided to change the squared shape of the cards to a more traditional rectangular format (9x12 cm), still with round edges and an orange backside. With this new card shape we introduced a second image to the design. Having two images there allowed us to play with the abstraction levels of the images (i.e. abstract-concrete) and the contents (i.e. human emotion-application). The intention here was to provide further entry points for designers to relate to the material and trigger new ideas. If they were not familiar with a given application or object, they could rely on the more general human-emotion or human-activity level. Similarly, if the content was too broad, they could rely on the more specific image to begin their design exploration.

Content-wise, the 22 definitions were edited to send a clearer and more concise message and 27 new images were introduced. Most of these new images were centered on depicting a human activity or emotional response, therefore giving the set a more human and approachable character. We also continued the process of refining the content of the existing images. We removed the reference to Usain Bolt as people made strong associations with that picture. However, we were unable to take out the following 6 references to famous people, TV series, and digital games: *Sex and the City* for 'Fellowship', *The Sims* for 'Simulation', *NintenDogz* for 'Nurture', *Tamagotchi* for 'Suffering', *Grand Theft Auto IV* for 'Subversion', and *Okami* for 'Sensation'. Since we had doubled the number of pictures to 44, we focused our search on finding new material rather than revising the existing content in detail.

4.3.2 Evaluation

The third version of the cards was tested with researchers from HIIT in Espoo, Finland. This group had already participated in the evaluation of the second version of the *PLEX Cards.* There were 11 participants involved who used 2 *PLEX Cards* decks in a full-day workshop. They used the cards both individually and in pairs.

Figure 3. Third version of the *PLEX Cards.* The 'Humor' card with two images and the new rectangular format.

Participants told us they preferred the new version of the cards with two images as they gave more possibilities to connect with the content. The cards had a strong positive impact in supporting idea generation during the design discussion:

"The PLEX (Cards) guided the concepting (process) heavily. It made me focus on a single aspect."

Participants commented on the role played by the cards as an object during the design exploration:

"I find the cards useful for bookmarking thoughts and ideas."

As Halskov and Dalsgaard [9] have pointed out, the cards work as repositories for statements and arguments, similar to the quote on using the cards as bookmarks for thoughts. As a result of this, the cards become strong structuring elements of the discussion. Buur and Soendergaard [2] have found that people associate meaning to each card, pointing at the cards as reminders of things to say, or waving them to attract attention to particular arguments.

We also received feedback on some images and one definition (i.e. 'Humor') that were still leading to confusion. We had a short iteration of the cards and modified 8 of them. This time we got rid of most of the problematic references that were still lingering in the cards (e.g. TV series, digital games, etc.), except *Sex and the City* and *The Sims* as we were having trouble finding good replacements for those images. This revised version was tested in the Maemo design sprint discussed in section 6.2. After four card iterations, now we had to look into detail at how the cards would be used in practice. We report that process later in section 5.

4.4 Fourth Version

The fourth version of the cards (cyan backside) (Figure 4) is available online [18] and evaluations are underway. There were two main reasons for making a next iteration of the cards, and they both have to do with image content. First, at different times we received feedback from the evaluations saying that some of the images felt "stereotypical and uninspiring." Studies on using images to create personas [19, 20] have identified that using stock
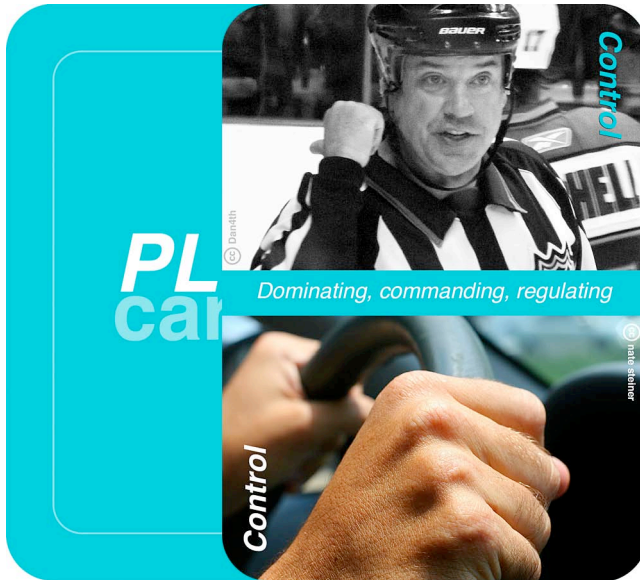
Figure 4. Fourth version of the *PLEX Cards*. The top half shows 'human emotions' in an abstract way, with pictures of faces in black and white to focus on the emotion. The bottom half shows concrete examples from 'everyday life', with color pictures of hands suggesting possible interactions.

photos inevitably results in showing a stereotype and in evoking a standard. Slick stock images contain a polished set of presuppositions and prejudices. In contrast, they have found that pictures of everyday people are natural, approachable, and more open for interpretation. Second, we wanted to be able to go public and freely distribute decks of *PLEX Cards* while addressing the issue with copyright. For these two reasons, namely having less stereotypical and copyright-free pictures, we turned to Flickr and began a new search for more natural material under the Creative Commons Attribution License [5] that allows us to perform derivative works of copyrighted photos provided we credit them.

5. PLEX CARDS TECHNIQUES

As described earlier, the design of the *PLEX Cards* had positively evolved through the different iterations. However, the actual use of the cards had remained unchanged. Participants would work in pairs, drawing one card from the deck to generate ideas until they felt they could no longer come up with new ideas. In order to explore alternative uses of the *PLEX Cards* that structure the innovation process, we developed two idea generation techniques: *PLEX Brainstorming* and *PLEX Scenario*.

5.1 PLEX Brainstorming

The first technique is *PLEX Brainstorming.* Although the term 'brainstorming' has had a precise definition in reference to the technique originally used since the 1930s, nowadays the term can refer to different settings of group idea generation [13]. *PLEX Brainstorming* aims at rapidly generating a large amount of ideas.

Participants of the idea generation session are split into pairs. Each pair is handed a deck with 22 *PLEX Cards.* The first participant randomly picks one card from the deck and places it face up on the table so that both participants can see the card. This card becomes the *seed card.* Both participants draw three extra cards from the remaining 21 *PLEX Cards* available in the deck.

Figure 5. The *PLEX Brainstorming* technique. The second player (right) elaborates on the idea that originated from the *seed card* by placing one of her cards on the table.

Participants look at their own cards, but not at the other's. The first participant begins explaining the idea on basis of the *seed card.* The second participant listens and considers the categories in his/her own cards. When the second participant feels that s/he can elaborate further on the idea, s/he takes one card from his/her hand, puts it down on the table, and explains how it changes the initial idea (Figure 5). When the first player thinks that s/he can continue with the idea based on the cards in his/her hand, s/he picks another card and places it on the table. After all three cards have been dealt on the table participants can freely discuss the idea. Based on the three cards available on the table, both participants agree on what the idea is about and write a description of it. Once all cards have been put back in the deck and the deck has been shuffled, then the participants can start a new idea generation process.

This technique was inspired by the *VNA* cards game [13]. The difference is that in *PLEX Brainstorming,* both participants initially have three random cards in their hands as opposed to one random card in VNA. This gives participants involved in *PLEX Brainstorming* some choice over which card they place on the table and use to extend the idea originating from the *seed card.* Although it does not define a winning condition, *PLEX Brainstorming* can be seen as a game because it is an activity bounded by rules (i.e. the procedure). Kultima et al. [13] note that rules make the idea generation game progress in an orderly fashion, and turn-taking provides equality for all the participants to contribute. The conceptual setting of a game can create a tension that becomes a driving force, where everyone wants to succeed. These factors facilitate idea creation.

After we had used *PLEX Brainstorming* for a while, we found an issue with idea documentation. The idea changes dramatically as new cards are laid on the table and is often completed after the last card has been shown. Only then it is documented. Unless the entire session has been recorded, interesting aspects stated in the beginning of the session may be left out of the documentation.
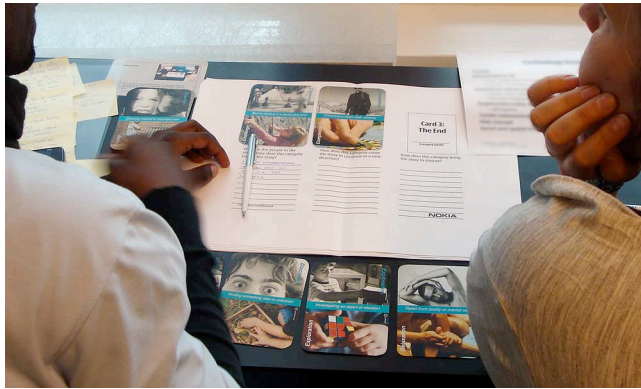
5.2 PLEX Scenario

The second technique, *PLEX Scenario,* aims at generating more "complete" idea descriptions in a short period of time, focusing on the quality and full-roundedness of the created ideas. Participants involved in the preparation of the first design case suggested the use of a game board to us when we presented the first and second versions of the *PLEX Cards.* Another inspiration for this technique was the *GameBoard* idea generation game [13].

Figure 6. The *PLEX Scenario* template. Questions on the template guide the creation of the scenario.

Figure 7. The *PLEX Scenario* technique starting with seven random cards on the table.

Similarly to the PLEX Brainstorming, participants of the idea generation session are split into pairs. Each pair randomly selects three *PLEX Cards* from the deck of 22 cards. Using an A3 template (Figure 6), participants create a scenario using the three cards. The scenario (or 'use story') is first triggered by an action related to the first card, then it is developed further with the second card, and it is finalized with the third card. Participants are allowed to change the order in which the cards were initially drawn, until they find a combination that helps them build a scenario. The scenario is documented on the template either as text or sketched as a three-frame cartoon strip.

In a variation of the technique (Figure 7), participants first randomly pick seven cards and put them face up on the table. The participants then create the scenario by selecting three of these available cards and place them in the order they choose.

6. CARDS & TECHNIQUES EVALUATION

We have conducted initial exploratory evaluations of the third version of the *PLEX Cards* (orange backside) and the two *PLEX Cards* techniques, by applying them in three design cases.

6.1 Design Case 1: EmoListen

In this first design case, we evaluated the practical use of the *PLEX Cards* for the first time. The EmoListen workshop was held in September 2009, in Espoo, Finland. The EmoListen team wanted to incorporate aspects of playfulness in the creation of two biofeedback concepts as these applications are typically serious in nature, and playfulness could further motivate their use. Ten researchers participated in the workshop, including game designers, game researchers and two PLEX researchers. Participants had seen previous versions of the *PLEX Cards* and had discussed them (section 4.2). We studied the *PLEX Cards* under two conditions: individual and collective use.

### 6.1.1 Individual Use of the PLEX Cards

In the first part of the workshop, we wanted to investigate how inspiring and how descriptive the materials (i.e. images and text) on the *PLEX Cards* were. Participants worked individually for 30 minutes on idea generation using the cards. Each participant randomly picked three different *PLEX Cards* from two available decks. In this phase, participants documented a total of 29 ideas.

Participants were asked to fill-in a first questionnaire once the individual idea generation phase had ended. In this questionnaire we asked participants to rate each of the *PLEX Cards* used during idea generation in terms of *inspiration* on a 7-point Likert scale (where -3 is very uninspiring, 3 is very inspiring, and 0 is neutral), and how *descriptive* the card's images and text were in relation to how the participant understood the experience category on a similar 7-point Likert scale (where -3 is not descriptive, 3 is well descriptive, and 0 is neutral). Eight participants responded the questionnaire, excluding the two PLEX researchers.

We obtained ratings for 17 out of the 22 categories as the cards were picked randomly. Overall, participants were positive on how inspiring the *PLEX Cards* were. Mean ratings for the different cards ranged between 0.50 and 2.00. Regarding how descriptive the content on the cards was, in general the content was perceived as descriptive of the categories. First, the mean ratings for most images (13 out of 17) were between 1.00 and 3.00. Four cards had lower mean ratings between -3.00 and 0.50. Second, the mean ratings for all textual descriptions ranged between 1.50 and 3.00, except for 'Control' that had a mean rating of 0.00.

6.1.2 Collective Use of the PLEX Cards

In the second part of the workshop, we assessed how inspiring the *PLEX Cards* were as a set (Figure 8, left). After putting up on a wall the ideas from the first part of the workshop, participants formed groups of two or three persons. Each group then randomly picked three new *PLEX Cards*, different from the ones used by the group members in the previous phase. After picking two existing ideas from the wall, the group developed two or three new concepts by elaborating on the ideas with the help of the three *PLEX Cards*. Nine new concepts were created and documented on A4 sheets. This part of the workshop lasted for 90 minutes.
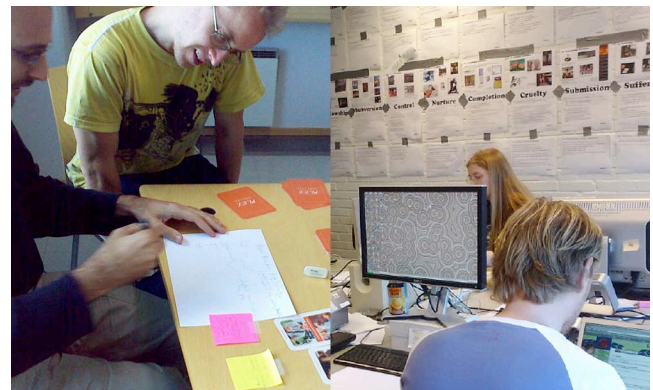
Figure 8. The EmoListen (left) and Ecoway design cases. PLEX descriptions on the wall for quick reference (right).

Again, participants were asked to fill-in a questionnaire after the group work ended. We asked participants to individually rate how inspiring the *PLEX Cards* were while combinig categories to come up with new concepts on a 7-point Likert scale (where -3 is very uninspiring, 3 is very inspiring, and 0 is neutral). Eight people responded the questionnaire, excluding the PLEX researchers.

In general, participants were positive on how inspiring the combined use of the *PLEX Cards* was. Most participants (6 out of 8) rated the cards with 2 or 3 (i.e. inspiring or very inspiring). The two remaining participants indicated that the combined use of the cards had had no influence on idea generation by rating it as 0. Therefore, no combination of the *PLEX Cards* was seen as uninspiring. The nine resulting concepts were all deemed interesting by the workshop participants and often included playfulness in surprising ways.

6.1.3 Design Case 1 Findings
The data from the questionnaires suggests that participants perceive the *PLEX Cards* as an inspiring tool for idea generation either when used individually or in combination. The data also indicates that the card contents (i.e. images and text) were perceived as descriptive of the PLEX categories they illustrate.

For this first use of the *PLEX Cards,* we had no other structure than picking random cards and using them one at a time in the first part, and in combination in the second part. We observed that using a single card produced simple straightforward ideas. The strong potential in combining a number of PLEX categories to create a more elaborate or surprising idea was not fully realized in the second phase due to a lack of a more structured approach. Based on this, we decided to develop the *PLEX Brainstorming* and *PLEX Scenario* techniques described in section 5 and use them in our subsequent design cases involving the *PLEX Cards*.

6.2 Design Case 2: Maemo
In this second design case, we continued our evaluation of the practical use of the *PLEX Cards*. This time, we also introduced the two techniques to structure the use of the cards in ideation sessions. The Maemo two-day workshop was held in October 2009, in Tampere, Finland. The Maemo team wanted to create novel application concepts in the domain of Augmented Reality that would evoke playful social interactions between users. Six participants (i.e. researchers and designers) took part in the workshop. Two participants had some prior knowledge on the PLEX framework, while the remaining four were new to PLEX.

During the two idea creation days, we used the *dialogue-labs* method [14] to structure the sessions. In *dialogue-labs,* different types of locations, materials and tasks initiate the discussion and the exchange of ideas between participants. During a *dialogue-labs* session, participants engage in ideation activities that are based on a range of visual and tangible materials (e.g. collage, video, prototyping), which provide different entry points to trigger their imagination, motivate and inspire them. We introduced *PLEX Brainstorming* and *PLEX Scenario* as two of the other idea generation methods and materials to be used during the workshop.

6.2.1 First dialogue-labs Session
In the first *dialogue-labs* session, we wanted to explore the use of *PLEX Brainstorming* in idea generation compared to other methods. In the first hour, participants worked in pairs to generate
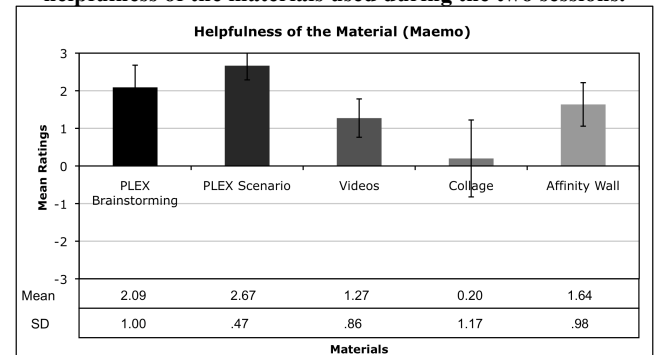
ideas. Each pair spent 20 minutes working with one of these three materials available in different room locations: video, collage and *PLEX Brainstorming.* Participants switched location and materials after 20 minutes. In each location, participants found printed instructions describing the task and the use of the available materials. In the video location, participants generated ideas after watching three videos relating to three PLEX categories: 'Fellowship', 'Thrill', and 'Exploration'. In the collage location, participants used images from magazines that were available on a table to create a scenario incorporating aspects of the PLEX categories 'Relaxation', 'Submission', and 'Expression'. Finally, in the *PLEX Brainstorming* location, participants generated ideas with the help of the *PLEX Cards* and the corresponding technique described in section 5.1. In the second hour, participants shared their ideas and developed them further by creating affinity walls.

At the end of the first and second *dialogue-labs* sessions, participants were asked to fill-in a questionnaire to assess the *helpfulness of the material* (on a 7-point Likert scale where -3 is not helpful, 3 is very helpful and 0 is neutral).

6.2.2 Second dialogue-labs Session
For the second *dialogue-labs* session, we introduced the second technique, *PLEX Scenario,* to investigate its practical use alongside the other methods. We followed a similar procedure as for the first session. This time, we replaced the collage location for *PLEX Scenario*, and in the video location we had three new videos (i.e. 'Captivation', 'Completion', and 'Humor') and three new PLEX categories. In the *PLEX Scenario* location, participants created a scenario of a playful social interaction in Augmented Reality using the technique as described in section 5.2. We used the variation of the technique, where we pre-selected seven cards and put them face up on the table. The participants picked three of these cards to create the scenario.

Table 2. Mean ratings and standard deviations on the helpfulness of the materials used during the two sessions.

Material	PLEX Brainstorming	PLEX Scenario	Videos	Collage	Affinity Wall
Mean	2.09	2.67	1.27	0.20	1.64
SD	1.00	.47	.86	1.17	.98

Helpfulness of the Material (Maemo) — Mean Ratings (y-axis), Materials (x-axis)

6.2.3 Design Case 2 Findings
We jointly calculated the mean ratings and standard deviations on the *helpfulness of the materials* from the first (n=6) and second (n=6) *dialogue-labs* sessions (Table 2). In general both *PLEX Brainstorming* (mean=2.09, SD=1.00) and *PLEX Scenario* (mean=2.67, SD=.47) were regarded as very helpful when compared to the *videos* (mean=1.27, SD=.86), *collage* (mean=0.20, SD=1.17) and *affinity wall* (mean=1.64, SD=.98).

For this second use of the *PLEX Cards,* we successfully introduced the *PLEX Brainstorming* and *PLEX Scenario* techniques. The data from the questionnaires and the feedback we received were positive. The design sprint produced concepts that

were deemed as being novel and of high quality by the participants. The two techniques seem to complement each other. The randomness present in *PLEX Brainstorming* can lead to the creation of radically new ideas, but occasionally can lead to a creative dead-end which results in discarding the current hand of cards. The more structured approach in *PLEX Scenario* allows participants to easily document their ideas as the template dictates a beginning, a middle and an end, with one PLEX category for each of these stages. In this design sprint, *PLEX Scenario* was used with seven pre-selected cards. Although this combination proved to be inspiring in the 20-minute sessions, longer sessions may need more cards or a change in the set of the available cards.

6.3 Design Case 3: Ecoway
Up to this point, we had mainly collected quantitative feedback on the cards and techniques by means of questionnaires. In this third design sprint, we also gathered qualitative feedback on the *PLEX Cards* and the *PLEX Brainstorming* technique. The Ecoway project was part of a 5-month course that started in October 2009, in Utrecht, the Netherlands. The course organizer wanted students to create an application that would elicit playfulness through social interaction. Eight fourth-year MA students in interaction design (ID) or game design (GD) formed a team to work on the project. The participants were not familiar with the PLEX framework. We provided them with a deck of *PLEX Cards* and gave them an introduction to the framework by means of a 70-slide PowerPoint presentation.

At the start of the project, the students organized a series of idea generation sessions in which they worked in pairs and used the *PLEX Brainstorming* technique. A total of 25 ideas were created during the idea generation sessions. After each session, participants filled-in a questionnaire inquiring how *inspiring* the used *PLEX Cards* were on a 7-point Likert scale (where -3 is very uninspiring, 3 is very inspiring, and 0 is neutral).

6.3.1 PLEX Cards
The data from the questionnaires confirms our earlier findings (section 6.1.3) in the sense that the *PLEX Cards* are an inspiring tool to generate ideas. Most mean ratings for the different cards were above 1.00, with the most inspiring ones being 'Exploration' (mean=2.33), 'Competition' (mean=1.66), and 'Expression' (mean=1.62). Only two cards were uninspiring: 'Nurture' (mean=-0.25) and 'Subversion' (mean=-0.80).

Regarding the qualitative feedback, in general participants positively commented on the cards to support idea generation:

"I think the PLEX (Cards) are a fresh, new method for brainstorming. I came up with some fun ideas which I normally don't come up with." [ID2]

"Overall I think the PLEX Cards are of great value when it comes to brainstorming. It forces one to think outside of the box, yet guided by playful experiences." [ID3]

"As a tool for brainstorming (the PLEX Cards are) valuable in providing a quick framework to generate a great quantity of ideas. As a quantitative tool it helps to easily sink into a creative mindset that allows for more higher quality ideation." [ID4]

As we reported in the evaluation of the second iteration of the *PLEX Cards* (section 4.2.2), participants still had problems with some images that narrow down the possibilities for interpretation:

"Sometimes the photos on the PLEX cards are too suggestive, they force you to think in a certain direction." [ID2]

"Some of the pictures are extremely leading, while others do not capture or completely miss what they are trying to portray. Some characters on the cards exhibit very strong emotions which are almost camouflaging what the cards are trying to show." [ID4]

These comments relate to the third version of the *PLEX Cards.* In the current fourth iteration, we have tried to address these issues.

6.3.2 PLEX Brainstorming
In general, there was an initial positive reaction from the participants after the use of the *PLEX Brainstorming* method:

"I found the PLEX cards a very good brainstorming method. It gave surprising and interesting results which were very useful in the rest of the process." [GD4]

"I had to learn its principles and get the vibe before it worked as an efficient brainstorming method. In the long run, when more acquainted with the method, I can see it working." [ID1]

Some participants reported having problems with the technique whenever they encountered a category that was difficult to them:

"The (PLEX) model itself is very defining and by forcing you to think with certain emotions gives me the feeling I get more boundaries than I want in a brainstorming phase. (Categories) like eroticism didn't add to the project at any moment. (As a) result when certain cards turned up on the table (...) they were discarded immediately. I don't think the problem is the cards themselves, but the system in which they are used." [GD3]

"During my initial brainstorms with the model, I found it extremely difficult to come up with a concept related to the (seed) card, most of all with the odd cards like cruelty or eroticism. (...) My entire thought process was blocked, causing some minor stress when it was my turn to come up with the idea." [GD2]

Finally, participants reflected on the usefulness of the *PLEX Cards* in the different parts of the design process (Figure 8, right):

"I think the real power of the PLEX Cards are in defining an existing idea, and making it more playful. (...) What also worked for us, is placing each PLEX category randomly on the wall in our project room. It was useful for me to (sometimes) look at them and come up with an idea." [ID2]

"In later stages of the development cycle the PLEX model allows itself to be used differently, as a iteration tool, an evaluation device or simply an inspirational direction. This diversity makes it a very strong model." [ID4]

6.3.3 Design Case 3 Findings
In this third use of the *PLEX Cards* and *PLEX Brainstorming,* the participants' feedback indicates the cards and the technique were perceived as useful to create a large amount of initial ideas in a short period of time. The PLEX framework was also used as a source of reference for playfulness that was put into use throughout the process of turning the ideas into concepts.

7. DISCUSSION
7.1 Designing for Playfulness
Based on Fullerton et al [7], we have defined playfulness as a state of mind, and as an approach to an activity. In our discussions on playfulness during the design sprints it became apparent that playfulness is foremost a state of mind that provides *enjoyment*. In

most cases, this enjoyment arises from doing (everyday) activities in a way that is different from how they are usually performed (e.g. typing a phone number in a rhythmical pattern). These actions may not be planned in advance, or last for very long. We understand playfulness as a *"spontaneous enjoyment arising from an action."* Designing for playfulness would then involve designing for minor actions that people can perform impulsively and with little effort, and that provide enjoyment. This differentiates designing for playfulness from game design as the latter is involved with creating systems with rules and content.

7.2 Implications for the PLEX Framework

The current set of 22 PLEX categories makes it difficult to design for playfulness in an efficient way. In the design sprints, it came to our attention that some of these categories relate on an *action-consequence* dimension. For example, one could argue that 'Exploration' leads to 'Discovery', or that 'Completion' is a motivation to reach an end state but not something you can design for. The way the PLEX categories are currently defined, some of them define *actions*, while others define *consequences*. Dividing the PLEX categories according to *action* and *consequence* would reduce the number of categories describing *actions* eliciting playfulness to 12: 'Challenge,' 'Competition,' 'Control,' 'Cruelty,' 'Eroticism,' 'Exploration,' 'Expression,' 'Fantasy,' 'Relaxation,' 'Subversion,' 'Sympathy' and 'Thrill'.

7.3 PLEX Techniques

Regarding *PLEX Brainstorming* and *PLEX Scenario*, we received both positive and negative comments on the techniques. Some participants considered that the structured approach provided concrete results, while others felt turn taking, selecting three cards, and building the idea from a *seed* card blocked their creativity. We have to conduct further experiments that include variations to both techniques (e.g. number of cards picked and used, number of participants, etc.) before we can say anything conclusive about their effectiveness as design methods.

8. CONCLUSIONS

The domain of playfulness is much broader than just games: potentially any activity can be approached and performed in a playful manner. The aim of designing for playfulness is to create objects that elicit a playful approach in the user and provide enjoyable experiences from using them. We have designed and evaluated four versions of the *PLEX Cards* based on the 22 categories of the Playful Experiences. Designers and other stakeholders who wish to design for playfulness can use the cards. Additionally, we have proposed *PLEX Brainstorming and PLEX Scenario* as two accompanying idea generation techniques for the *PLEX Cards*. We have evaluated the practical use of the cards and the techniques in three design projects. The results show that the *PLEX Cards* are a valuable source of inspiration when designing for playfulness and the *PLEX Brainstorming* and *PLEX Scenario* techniques help create a large amount of ideas in a short time. Our results also indicate that the *PLEX Cards* can be useful for different stages of the design process. The cards may help the *analysis* of the problem at the start at the start of the design process, provide inspiration for *idea generation,* and guide the *evaluation* of the resulting design. Future work includes testing the effectiveness of the two techniques as design methods using the fourth version of the *PLEX Cards*.

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