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## The *PLEX Cards* and its techniques as sources 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 helpfulness of both the cards and their associated techniques in two studies. The results show that the *PLEX Cards* and its associated techniques are valuable sources of inspiration when designing for playfulness.

**Keywords:** design methods; workshop; inspiration; playfulness; *PLEX Cards*.

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### 1 Introduction

Playfulness is a broader human phenomenon than playing games. Play is deeply rooted in human culture, as proposed by pioneering anthropologist Huizinga (1955). 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 (1961) 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 (Frasca, 2003).

According to Fullerton et al. (2004), 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 (Fullerton et al., 2004). 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.

Recently, designers and researchers have started designing for playfulness. Bekker et al. (2010) apply three design values for playful interactions (i.e. motivating feedback, open-ended play and social interaction patterns) in six design cases ranging from toy battle-tanks controlled through body movements to objects that change colour when shaken or rolled. Designing for playfulness has also been identified as an approach to change users’ behaviour. Chiu et al. (2009) discuss how, by adding interactive elements and using persuasive strategies, they turn an everyday object (i.e. a water bottle) into an item for play that elicits adopting healthier habits.

Korhonen et al. (2009) have defined a playful experiences framework (PLEX). The framework consists of 22 playful experience categories (Arrasvuori et al., 2010, 2011). Both the PLEX and the mechanics, dynamics and aesthetics (MDA) (Hunicke et al., 2004) frameworks aim at incorporating elements of playfulness in the design process as means to achieve specific experiences. However, 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’ and ‘competition’), while others may seem surprising in this context (e.g. ‘cruelty’ and ‘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*.

This paper is structured as follows. Firstly, we provide background information on the PLEX framework and discuss related work. Secondly, we introduce the design process of the five versions of the *PLEX Cards*, followed by an evaluation of the final version of the *PLEX Cards*. Thirdly, we present two idea generation techniques and the results of an evaluation during a workshop. Finally, we provide a discussion and conclusions.

## 2 PLEX framework

Costello and Edmonds (2007) 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 mostly focuses on the evaluation of pleasurable playful interfaces in interactive artworks.

To adjust and expand the framework, Korhonen et al. (2009) 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 the basis of the findings, the authors added new categories to PLEX. In this paper, we explore the use of the PLEX framework as inspiration to design for playfulness (Table 1).

**Table 1** PLEX framework consisting of 22 categories

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

### 3 Related work

We will now discuss other 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-centred design activities. Halskov and Dalsgaard's inspiration cards (2006, 2007) 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 (2000) were created to allow developers to collaboratively and directly analyse bits of videos collected in field studies. Short video sequences are first digitised 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 (2004) have developed four games that combine the use of three different types of cards:

- 1 Moment cards, a radio frequency identification-based implementation of the video cards.
- 2 Sign cards, consisting of words to create stories and provide a conceptual framework for these stories.
- 3 Trace cards or pictures of the surroundings collected from field studies.

The IDEO cards (IDEO, 2003) consist of a deck of 51 cards, each showing a different method used by IDEO to keep people at the centre 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 (Sleeswijk Visser et al., 2005) 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 and illustrations) and researchers' interpretations (e.g. visualisations).

Our *PLEX Cards* share core aspects with the previously discussed design cards. Firstly, the *PLEX Cards* help facilitate user-centred design activities when used by researchers, designers and other stakeholders involved in the design process. Secondly, the *PLEX Cards* were created as a rich source of inspiration for creative processes. Finally, the *PLEX Cards* are a low-tech and approachable way to communicate the PLEX framework categories.

#### 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. (2008) have designed two card sets to generate ideas for mobile multiplayer games: the verbs, nouns and adjectives (VNA) cards and the GameSeekers cards. The VNA cards consist of three decks of cards with one word, each deck containing VNA. Analysing 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 colour-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 (2006) 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 2 min to avoid being disqualified. The game is over when there is only one player left and the ideas can then be evaluated. Sampanthar (2007) created ThinkCube 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 four to seven players who each draw six 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 three design sprints where we used PLEX to guide design exploration. In each design sprint, we used a different strategy to communicate the PLEX categories. Firstly, we briefly projected a PowerPoint slide with the definitions of the categories on the wall. Secondly, we printed an A0 poster with the definitions. Finally, we distributed PowerPoint handouts with definitions and examples of the categories. Designers and other stakeholders involved in these three 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 of five versions of the *PLEX Cards*.

## 4.1 First version

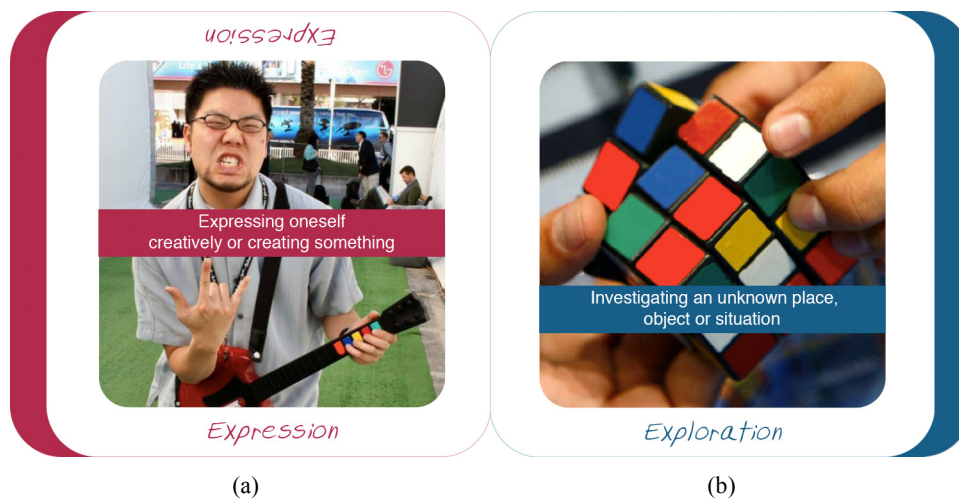
### 4.1.1 Design process

The first version of the *PLEX Cards* consisted of 22 cardboard cards (Figure 1(a)). The cards were squared ( $9 \times 9$  cm) and had round edges. To avoid a common physical limitation of cards (Buur and Soendergaard, 2000), 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 colour-coded red to identify the version and had the name of the card deck.

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 and Age of Empires) or other types of games (strip poker, fantasy play and gambling). Other image sources were internet applications (Google Street View, Nokia Sports Tracker and Google Earth) and TV shows (24, Itchy and Scratchy, Sex and the City).

The cards' contents (i.e. definition and images) had to succinctly and unequivocally exemplify each category (Halskov and Dalsgaard, 2007). For this first version of the cards, we did a thorough internet image search. We mostly used stock images of 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.

**Figure 1** First version and second versions of the *PLEX Cards*: the 'expression' card with its long definition and a reference to Guitar Hero (a) and the 'exploration' card with an image that suggests an action (b) (see online version for colours)



### 4.1.2 Evaluation

This version of the cards was tested in a first Social and Spatial Interactions (SSI) workshop in fall 2009 in Tampere, Finland. A total of eight 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 four to six 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 (2006) found with their inspiration cards 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 1(b)). 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 and 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 1(b) 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.

#### 4.2.2 Evaluation

The second version of the cards was evaluated with researchers from Helsinki Institute for Information Technology (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, who 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 to 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 to 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



100 m 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 (2009), and Sleeswijk Visser and Stappers (2007). 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 (2006) 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 2(a)). 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 ( $9 \times 12$  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 centred 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 six 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.

**Figure 2** Third and fourth versions of the *PLEX Cards*: the ‘humour’ card with two images and the new rectangular format (a), and the ‘control’ card (b). 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 colour pictures of hands suggesting possible interactions (b) (see online version for colours)



#### 4.3.2 Evaluation

The third version of the cards was tested in the EmoListen workshop 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 two *PLEX Cards* decks in a full-day workshop. They used the cards both individually and in pairs.

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 (2006) 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 (2000) 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. ‘humour’) that were still leading to confusion. We had a short iteration of the cards and modified eight 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. Evaluations of this revised version are reported elsewhere (Lucero and Arrasvuori, 2010).

#### 4.4 *Fourth version*

For the fourth version of the cards (cyan backside) (Figure 2(b)), the overall size and shape of the card remained unchanged with respect to the previous third version. Regarding the layout, on the front side we decided to maximise the space devoted to the two photos by removing the white frame around the card. In this way, we hoped people would be able to focus more on the images by perceiving more details in the photos. We also moved the names of the categories to the top-right and bottom-left corners of the card, so that people could hold the cards in their hand like they would do with a traditional deck of playing cards.

There were two main reasons for making a next iteration of the cards, and they both have to do with image content. Firstly, 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 (Pruitt and Grudin, 2003; Sleeswijk Visser and Stappers, 2007) have identified that using stock 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. Secondly, we wanted to be able to go public and freely distribute decks of *PLEX Cards* while addressing the issue of 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 (<http://www.flickr.com/creativecommons/>) that allows us to perform derivative works of copyrighted photos provided, we credit them.

#### 4.5 *Final PLEX Cards*

The fifth and final version of the cards (Figure 3) is available online (<http://www.funkydesignspaces.com/plex/>). Up to this point, we had mainly concentrated on finding the right language and content that would allow us to communicate the 22 *PLEX* categories. Once we had produced a number of iterations of the cards and received feedback on the different versions, we felt it was time to print the *PLEX Cards* in offset so that others could start using them. We decided to redesign the overall look and feel of the cards. The new version uses magenta as its main colour and VAG Rounded as its main font instead of the more traditional Helvetica. The design for the back of the card incorporates a playful pattern in magenta (Figure 3(a)). Additionally, we created two new instruction cards that explain how the *PLEX Cards* can be used, and we also designed a box that would contain all 24 cards (22 *PLEX* and two instruction cards).

Regarding the layout of the card, we did not introduce any further changes with the exception of moving the category names to the top-left and bottom-right corners of the cards (Figure 3(b)). We noticed that people were unable to see the category names

of the cards when holding the cards in their hands. We realised we had mistakenly placed the category names in the opposite corners.

After five card iterations, now we had to look into detail at how the cards would be used in practice. We have split that process into two parts. Firstly, in Section 5, we will present an evaluation of the perceived helpfulness of the *PLEX Cards* during two workshops ( $n = 27$ ). Then, in Section 7, we will report the evaluations of two techniques (i.e. *PLEX Brainstorming* and *PLEX Scenario*) during one workshop ( $n = 14$ ).

**Figure 3** Fifth and final version of the *PLEX Cards*. The design for the back of the card incorporates a playful pattern in magenta (a). The overall layout of the front side of the deck remains almost unchanged from versions three and four, except for the use of VAG Rounded as the main font (see online version for colours)



## 5 *PLEX Cards* evaluation

Two evaluation sessions were organised to assess the perceived helpfulness of the final version of the *PLEX Cards*. In both sessions, the cards were used for ideation with different techniques. The cards were evaluated both quantitatively (i.e. on a seven-point Likert scale) and qualitatively (i.e. open-ended questions).

### 5.1 First evaluation session: SSI

The first evaluation was held in October 2010 in a Nokia Corporate Training Facility in Nokia, Finland. The purpose of the workshop was to generate playful ideas for the SSI platform (Lucero et al., 2010) allowing it to extend the current shared co-located interactions with mobile phones to other physical and social use contexts (e.g. sharing media content in a park, outdoor sports and multiplayer games).

Fourteen participants with a mix of backgrounds (i.e. sociologists, designers, engineers and psychologists) were actively involved in the workshop. The session was arranged with participants from Mobile Life Centre and Nokia Research. All participants were new to the final *PLEX Cards*. Participant familiarity with the PLEX framework ranged between very familiar ( $n = 2$ ), moderately familiar ( $n = 8$ ) and unfamiliar ( $n = 4$ ).

In previous workshops, the *PLEX Cards* had successfully been used as inspirational stimulus, but in an unstructured way. This time we wanted the cards to be used in a more structured manner. We introduced two idea generation techniques, *PLEX Brainstorming* and *PLEX Scenario*, to structure the use of the cards in ideation sessions. These two techniques are later introduced and evaluated in Sections 6 and 7, respectively. However, for the evaluation's current purpose of assessing the helpfulness of the cards, the reader only needs to know that two structured techniques were used. The 14 participants were split into 7 pairs. Each pair was given a complete *PLEX Cards* deck containing the 22 categories. Four pairs began the ideation with one condition (i.e. *PLEX Brainstorming*), while the other three pairs began with the other condition (i.e. *PLEX Scenario*). Each group roughly spent 30 min generating ideas using the corresponding technique twice, after which they switched to the other technique for another two rounds creating more concepts. Each participant used a total of 12 *PLEX Cards*; three cards in each of the four rounds. After each round, the cards that they had used to generate ideas were removed from the deck to avoid using a card more than once. In total, the idea generation session lasted 60 min. The participants responded to the first half of a questionnaire after using the first technique and to the latter half of the questionnaire after using the second technique. The questionnaire is later explained in Section 5.3.

## 5.2 *Second evaluation session: Emokeitai*

The second evaluation was also held in October 2010 in the Media Centre Lume located at the University of Art and Design in Helsinki, Finland. The purpose of the workshop was to generate ideas for a service that encourages users to collect and share biosensor data of their physical condition in a playful way. The organisers of the workshop wanted to use *PLEX Cards* as stimuli to incorporate aspects of playfulness in the service.

Thirteen participants with different backgrounds (e.g. researchers, engineers and psychologists) took part in the workshop. These participants worked at different universities (i.e. HIIT, Helsinki School of Economics, Helsinki University and Aalto University) or for different companies (i.e. Polar and Nokia). More than half of the participants ( $n = 7$ ) were new to both the PLEX framework and the *PLEX Cards*. The rest of the participants had participated in the EmoListen workshop (Sections 4.2.2 and 4.3.2), and thus were moderately familiar with the framework and an earlier version of the cards.

The idea generation session progressed as follows. The 13 participants formed 5 pairs, and 1 group of 3. Each group was handed out half of a *PLEX Cards* deck, in other words, 11 randomly selected cards from a deck. As there were six groups, three full-card decks were used. Each group placed the 11 cards face up on the table. Firstly, participants picked one PLEX card and began generating and discussing together service ideas using that category. After 4 min, participants were instructed to continue the exploration by picking a new card. This process was repeated five times for a total of 20 min. Later, each group picked up a sixth card and had 10 min time to consider the sixth PLEX category and write a short description of the resulting service concept. Thus, the entire idea creation session lasted 30 min. This first idea generation session had no other structure

than sequentially using 6 of the 11 cards that were randomly selected from the deck. Finally, participants were asked to individually respond to a questionnaire once the group idea generation had ended.

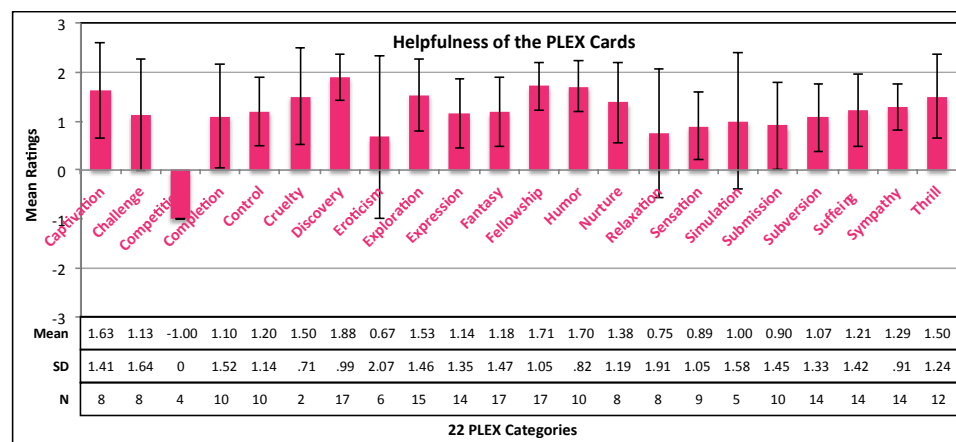
### 5.3 Quantitative results

We conducted both a quantitative and a qualitative evaluation of the *PLEX Cards* by applying a similar questionnaire in the two evaluation sessions. Regarding the quantitative part, we jointly calculated the mean ratings and standard deviations for the first and second sessions ( $n = 27$ ). In the first item of the questionnaire, we asked participants about their general impression after using the *PLEX Cards*. The participants responded on a seven-point Likert scale where  $-3$  is very negative,  $3$  is very positive and  $0$  is neutral. The overall response was clearly positive (mean =  $1.37$  and  $SD = 1.04$ ). Only one participant responded to have a negative general impression by giving it a  $-2$ , while two participants reported having a neutral general impression of the cards. Next, the participants were asked to rate the helpfulness of each of the six *PLEX Cards* in thinking about playfulness for the concept. The participants responded on a seven-point Likert scale where  $-3$  is very unhelpful,  $3$  is very helpful and  $0$  is neutral. We jointly calculated the mean ratings on the helpfulness of the *PLEX Cards* from both workshops (Figure 4).

Generally speaking, participants were positive about the helpfulness of the individual *PLEX Cards*. The mean ratings for the different cards ranged between  $0.67$  and  $1.88$ , except for ‘competition’ (mean =  $-1.00$ ). The standard deviations ranged between  $0$  and  $1.52$ , except for ‘eroticism’ ( $SD = 2.07$ ), ‘relaxation’ ( $SD = 1.91$ ) and ‘simulation’ ( $SD = 1.58$ ). Regarding ‘competition’, we observed that in the Eموكيتاي workshop, two participants reported using this category as the fifth card during idea generation, which made it difficult for them to continue the exploration:

“The fifth card (‘exploration’) was hard to choose. It did not seem to bring anything new to the concept” [P21].

**Figure 4** Combined participant mean ratings and standard deviations on the helpfulness of each of the *PLEX Cards* (see online version for the colours)



Note: Error bars represent the 95% confidence interval of each mean.

Regarding the high standard deviations for ‘eroticism’, ‘relaxation’ and ‘simulation’, we have observed that some categories are very good at triggering people, but can in other cases block the participants. ‘Eroticism’ is a clear case of such a category, where two participants rated it with 3, and other participants gave it –1 or –2. This is inline with our findings from previous studies (Lucero and Arrasvuori, 2010). Two participants working together concentrated the negative ratings for ‘eroticism’ (–1 and –2) and ‘relaxation’ (both –2). One of them was critical about the cards in general:

“(The cards tend to) control my imagination too much, because I feel forced to use them. Sometimes ideas rise from the (cards) too. I could use tarot cards to get ideas too” [P20].

#### 5.4 *Qualitative results*

Regarding the qualitative feedback, in general, participants positively commented on the *PLEX Cards*’ role in supporting idea generation and guiding thinking about playfulness:

“(The cards) did kind of focus my usually chaotic brainstorming” [P24].

“Having these props ‘forces’ you to think of/consider the subject from a varying set of aspects in a systematic way” [P22].

“I think a lot of their power came from the inspirational pictures rather than the categories” [P6].

“It is good that the categories are so varied! I liked that” [P4].

Participants often mentioned that categories that could normally be considered controversial in the context of playfulness (e.g. ‘eroticism’ or ‘cruelty’) were actually helping participants to think in unconventional ways about playfulness:

“The ‘stronger’ cards such as submission and cruelty gave me a permission to express some unconventional view. (...) I like the more controversial categories like cruelty... they force you to take unconventional views” [P24].

“(The cards) brought up non-conventional configurations of those features, even when not randomised. (...) Submission and fellowship forced to think about the relation of the player to a larger context and not just the most obvious single player option” [P26].

“(The cards) helped trigger ideas that may not have come otherwise. E.g. on otherwise sensitive topics such as eroticism, suffering...” [P3].

One participant proposed that the *PLEX Cards* could be more stimulating if they had more extreme examples of playfulness:

“(The cards) could be wilder in themes ... (Improve the cards by) widening the theme spectrum, add strongly provoking concrete example cards” [P6].

Finally, participants proposed some future improvements for the card design, including making the *PLEX Cards* more like playing cards and providing more options:

“Physically they could be more like real playing cards. (You could) slide (them) over each other better and (they would be) easier to shuffle” [P1].

“If the backside was the same both right (side up) and upside down, you could use the direction of the card as a random selection (which) could be useful in some brainstorming techniques” [P10].

“Since the images formed the idea, it would be good (to) have different images. Maybe more copies of each card or a digital version switching images” [P10].

## 6 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. To explore alternative uses of the *PLEX Cards* that structure the innovation process, we developed two idea generation techniques: *PLEX Brainstorming* and *PLEX Scenario*.

### 6.1 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 1930s, nowadays the term can refer to different settings of group idea generation (Kultima et al., 2008). *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.

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 she/he can elaborate further on the idea, she/he takes one card from his/her hand, puts it down on the table and explains how it changes the initial idea (Figure 5(a)). When the first player thinks that she/he can continue with the idea based on the cards in his/her hand, she/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 (Kultima et al., 2008). 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. (2008) 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.



**Figure 5** In *PLEX Brainstorming* (a), the second player (top) elaborates on the idea that originated from the *seed card* by placing one of his cards on the table. In *PLEX Scenario* (b), participants start with seven random cards open on the table (see online version for colours)



(a)

(b)

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 are 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.

## 6.2 *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 (Kultima et al., 2008).

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 finalised 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 to 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 5(b)), 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.

**Figure 6** The *PLEX Scenario* template. Questions on the template guide the scenario creation (see online version for colours)

Card 1: Beginning	Card 2: Continuation	Card 3: The End
Who are the people in the story? How does this category launch the story?	How does this category cause the story to continue in a new direction?	How does this category bring the story to a close?
_____	_____	_____
_____	_____	_____
_____	_____	_____

## 7 PLEX Cards techniques evaluation

The *PLEX Brainstorming* and *PLEX Scenario* techniques were evaluated during the SSI workshop described in Section 5.1. As mentioned previously, 14 participants were split into 7 pairs. Each pair was given a final version of the *PLEX Cards* deck. The idea generation started so that in the first 30 min four groups went through two rounds of the *PLEX Brainstorming* technique to create concepts, while the other three groups used the *PLEX Scenario* technique twice. After that, the groups switched to use the other technique for an additional two rounds. In total, the idea generation session lasted 60 min.

The procedure for *PLEX Brainstorming* was as described in Section 6.1, with the exception that the first participant or player picked the *seed card* from their hand instead of the deck. *PLEX Scenario* was adapted so that in the first round using the technique, the three cards were selected randomly. In the second round, seven cards were randomly drawn from the deck and placed face up on the table so players could pick three of them.

Three *PLEX Cards* were used in each round to create a concept. The used cards were removed from the deck. Participants were asked to fill-in questions related to the two idea generation techniques once they had all completed four rounds using the techniques.

### 7.1 Quantitative results

Regarding the quantitative part, we asked participants to rate their general impression upon using the *PLEX Brainstorming* and *PLEX Scenario* techniques. The participants responded on a seven-point Likert scale where  $-3$  is very negative,  $3$  is very positive and  $0$  is neutral. Participants were positive about both techniques with a slight preference for *PLEX Scenario* (mean = 1.43 and SD = 1.45) over *PLEX Brainstorming* (mean = 1.36 and SD = 1.15). Only two participants rated the techniques negatively by giving them  $-1$  or  $-2$ .

## 7.2 Qualitative results

As stated earlier, participants were equally divided in their preference for both the techniques. Those who preferred the *Scenario* technique often mentioned the structured approach better suited their way of working:

“Fun, easy. Sometimes hard to start. Overly easy to finish. Excited to see stories evolve quickly” [P1].

“I like (*Scenario*) better because it is more structured and directed (...) especially to begin with (idea generation)” [P2].

“(It was) a bit challenging to think of (an idea to have) a beginning, continuation and end. But it made the ideas very concrete” [P4].

“(Scenario) adds a twist to the thinking. Playfulness derives mostly (from) the combinations and arrangements. The structure is very important” [P8].

The rest of the participants preferred the *Brainstorming* technique. The main reason was that they felt it was faster and more flexible:

“I preferred the ‘looser’ one in the beginning, rather than the story structure. (It) may not need that much structure apart from the cards” [P3].

“(The *Scenario* technique was) slower and more vague than the Brainstorming technique. Perhaps a different structure might work better” [P9].

“(In *Scenario*), the first card formed most of the idea. We used (the technique) pretty linearly, I think it would be useful to jump back and forth (between the picked PLEX categories) a bit more” [P10].

Finally, participants identified a general problem with both techniques. As with any ideation method, it is of utmost importance to clearly define a task or design problem:

“(You) need a good clear question to begin. The best ideas came when there was a ‘fuzzy’ idea in the beginning, and it got clearer along the way” [P10].

“(It) misses the first step: setting up a situation (e.g. a park with three friends who are bored)” [P13].

## 8 Discussion

### 8.1 Designing for playfulness

Based on Fullerton et al. (2004), 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.

### 8.2 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’.

### 8.3 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 in comparison to other design methods.

## 9 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 five 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 two design workshops. The results suggest that the *PLEX Cards* are a valuable source of inspiration when designing for playfulness. The *PLEX Brainstorming* technique helps to generate a large amount of ideas in a short time, while the *PLEX Scenario* technique facilitates creating more elaborate ideas. Our results also indicate that in order for the *PLEX Cards* techniques to be effective as ideation methods, it is of utmost importance to frame the design problem by setting a clear task or context. Future work includes further testing the effectiveness of the two techniques as design methods.

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