PLT (Persona Logical Thinking): A Method to Generate User Requirements for Multidisciplinary Design Teams

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ABSTRACT

In this paper, we present a new original method to generate user requirements, Persona Logical Thinking (PLT). Because this method combines several ways of reasoning (empathetic thinking and logical thinking), we hypothesized that it would be particularly efficient for multidisciplinary design teams. To test this assumption, we compared PLT to an empathetic method and to a logical method for generating user requirements for tablets in the education field. We organized working sessions of 60 minutes with 4 designers (from student population of engineers, industrial designers and ergonomists). Nine working sessions were conducted with a total of 36 participants (21 males and 15 females aged 25 years old on average). To evaluate the effectiveness of the three methods, we collected two variables: quantity and originality of user requirements, classified into three categories (User's Needs, Product Functions and Technical Solutions). Our results show that teams were more productive with PLT for the generation of product functions (examples: thinness, being powerful, long life battery…), including original functions (be recyclable, be resistant to chemical substances...). These preliminary results being promising for improving the innovation process, we discuss the future steps that would be necessary to validate our method.

Keywords: User requirements, Design team, Multidisciplinary, Innovation.

INTRODUCTION

According to Aoussat (1990), the design team is usually multidisciplinary with experts from different domains such as engineering, industrial design, ergonomics or marketing. Each domain and each expert has his own skills (knowledge, point of view, tools and methods...) and it may sometimes prove difficult to share knowledge within the team. Some studies have already been conducted about difficulties to speak in group (Diehl and Stroebe, 1987), about the impact of personality (Bouchard, 1969) and also on the level of expertise of participants (Bonnardel and Marmèche, 2005). To improve knowledge sharing and increase the efficiency of the design team, it is desired to use methods that enable the expression and combination of everyone’s viewpoint. Our PLT (Persona Logical Thinking) method was designed for this purpose. It relies on two existing methods from different field: the "Persona" method used in Marketing and Ergonomics (Pruitt and Grudin, 2003; Pruitt and Adlin, 2006) and the "EPMcreate" method used in Engineering (Mich, Anesi and Berry, 2005). These methods are based on opposite ways of thinking: empathetic thinking (Persona) and logical thinking (EPMcreate). We believe that these types of reasoning will have an influence on the processing of user requirements. Therefore, we created PLT as a hybrid method based on the Persona and EPMcreate.

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STATE OF THE ARTS

Persona

A Persona is a concept created by Cooper (1999) and developed by Pruitt and Grudin (2003) and Pruitt and Adlin (2006, 2010). It is a fictitious person representing a category of future users. For Blomquist and Arvola (2002), "a persona is an archetype of a user that is given a name and a face, and it is carefully described in terms of needs, goals and tasks". Information about future users is supposed to create a sense of empathy to help the design team refine the concept and the future product. This process allows feeling and interpreting action, thought and emotion of the users that are represented (Bornet and Brangier, 2013).

EPMCreate

EPMcreate (Elementary Pragmatic Model Creative Requirements Engineering TEchnique), is a method used to generate solutions to a problem. This method is based on logical thinking and allows designers to take different combinations of users viewpoints in order to identify their requirements (Mich, Anesi and Berry, 2005; Sakhnini, Mich and Berry, 2012). Ideas are generated in mini brainstorming sessions. In each mini session, the workgroup tries to adopt a different viewpoint. For example, with two users there are 16 mini sessions, corresponding to 16 combinations of viewpoints using Boolean operators: OR, AND, NOT… In the first step the workgroup generates requirements which are common to user 1 and user 2 (AND), in the second step it generates requirements of user 1 that do not concern user 2 (AND and NOT), etc.

EXPERIMENT

Hypothesis

The Persona method is used by marketing and ergonomists experts. It generates qualitative ideas because it allows designers to identify with users through the creation of complete profiles. EPMcreate method is used by engineers. It allows a logical reasoning by combining the viewpoints of users. It bootstraps the generation of user requirements independently from each one's capacity to identify with users. Our PLT method is a combination of these previous methods, including full profiles of Personas as well as the list of questions from the EPMcreate. PLT aims to give all team members the opportunity to contribute to the generation of user requirements with his own capacities: empathetic and/or logical thinking mechanisms. In this respect, PLT is expected to be more efficient for multidisciplinary design teams than single-mechanism methods (empathetic-only as Personas or logical-only as EPMcreate).

Methods

In our experiment, we asked the participants to generate user requirements for tablets in the education field, in three conditions: Persona condition based on empathetic thinking, EPMcreate condition based on logical thinking and PLT condition based on both types of reasoning. We hypothesized that the latter would be more efficient for multidisciplinary design teams. For the Persona condition we designed 4 personas: Tim, who is a lower high school student, Julie a University student, Myriam a lower high school teacher and Marc an upper high school teacher (figure 1). Participants had to immerse themselves into these personas and generate requirements for each profile.

Figure 1. Two personas, Tim and Myriam developed in our study.

For the EPMcreate condition we conducted 30 mini working sessions for 4 users: a lower high school student, a University student, a college professor and a high school teacher. Contrary to the Persona condition, these categories of future users were neither personified nor illustrated. Participants were asked to answer the following questions (2 min / mini session):

-Session 1: What are the requirements for a University student?
…
-Session 5: What are the requirements that are common to a University student and a lower high school student?
…
-Session 11: What are the requirements specific to a University student and that do not concern a lower high school student?
…
-Session 23: What are the requirements which concern neither a University student, nor a lower high school student?
…
-Session 29: What are the requirements that are common to the four categories of users?
-Session 30: What are the requirements which concern none of the four categories of users?

Finally, the PLT condition was a combination of the two previous ones. The personas Tim, Julie, Myriam and Marc were introduced to the participants and integrated into the 30 mini working sessions:

-Session 1: What are the requirements for Julie?
…
-Session 5: What are the requirements that are common to Julie and Tim?
…

Procedure

We organized working sessions of 60 minutes with design teams composed of engineers, industrial designers and ergonomists. Nine working sessions were conducted with 4 participants each (i.e. 36 participants including 21 males and 15 females, aged 25 years old on average) to test our three experimental conditions. The first condition (Persona) began with a brief reading of the first persona, followed by free generation of user requirements by the participants. After 15 minutes they read the second persona, etc. In the second condition (EPMcreate) each question took 2 minutes (60 minutes in total). In the last condition (PLT), the session began with reading of the four personas and after that, the 30 questions were asked. In all conditions, ideas were expressed by speech and an animator was in charge of noting the requirements on a flipchart (figure 2).

Figure 2. Snapshot of a working session.

We collected two kinds of variables: quantity and originality of the production, which are common criteria for the evaluation of creative production (Osborn, 1948; Jaoui, 1990; Casakin and Kreitler, 2005; Bonnardel, 2006). Originality, which is important in innovation projects, was measured by collecting unique requirements appearing only once in all groups' production.

RESULTS

The whole corpus contained 1116 requirements. After cleaning duplicates in each group's production we retained 945 ideas. Regarding quantity, there were 340 ideas in "EPMcreate" condition (113 ideas in average per group), 322 ideas in "PLT" condition (107 in average) and 283 ideas in "Persona" condition (94 in average). Regarding originality there were 232 ideas in "EPMcreate" condition, 222 ideas in "PLT" condition and 206 in "Persona" condition (figure 3). The median test performed with SPSS shows that the difference between the three conditions are not significant (p=0,638).

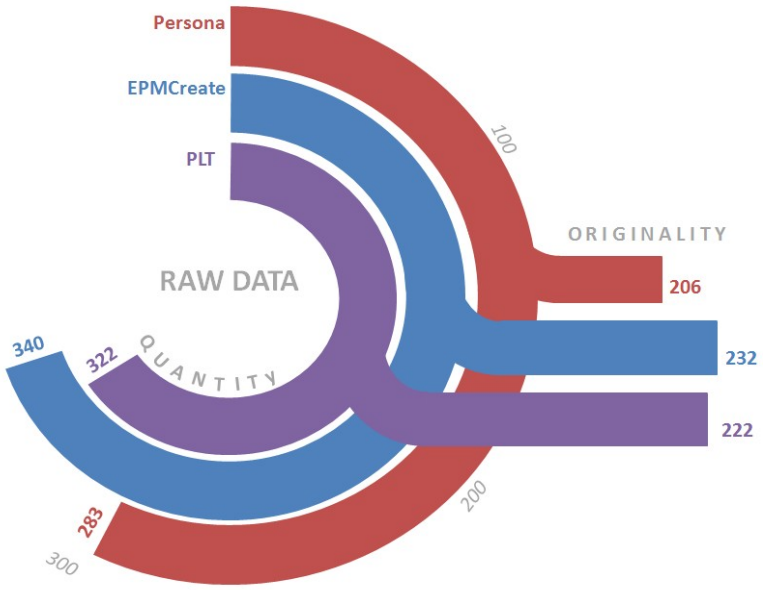

Figure 3. Raw data about Quantity and Originality.

The requirements were categorized as User's Needs (e.g. "enable the students to discuss with the teachers", "allow personalization", "support group work", "allow book reading"…), Product Functions (e.g. "be thin", "be easy to use", "have powerful processor", "be waterproof"…) and Technical Solutions (e.g. "include an agenda", "include games", "incorporate a USB port", "feature the school plan"…). Figure 4 shows method productivity for these three categories.

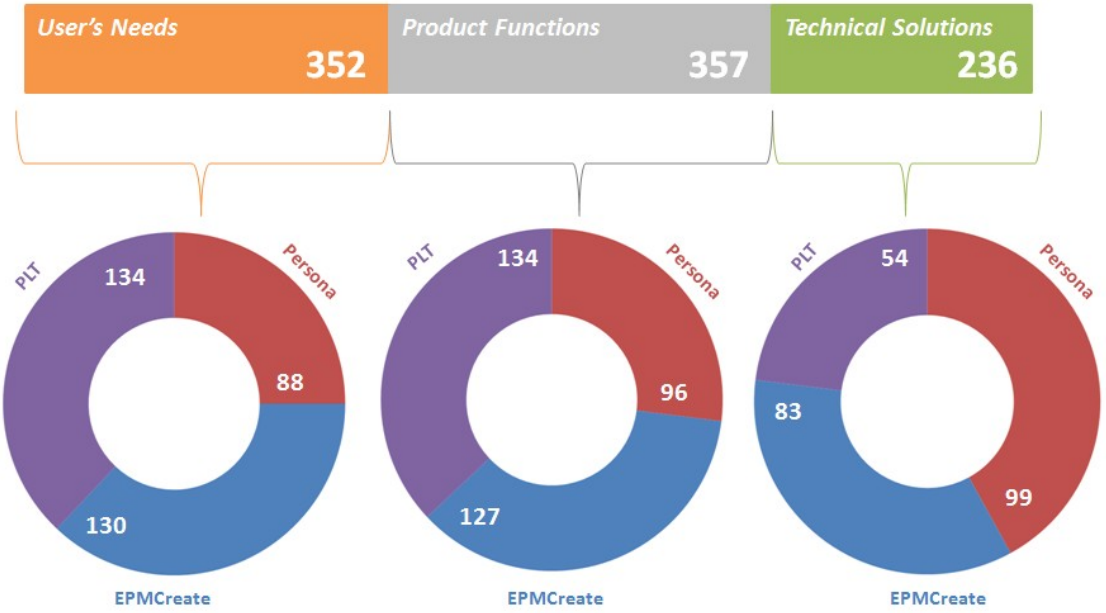

Figure 4. Distribution of requirements by conditions.

The median test shows that PLT was significantly more productive for the generation of Product Functions (p=

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0.043) and EPMcreate was significantly more productive for Technical Solutions (p=0,043). Regarding originality, "PLT" method also enabled the teams to generate more original Product Functions than the other methods (p= 0.043). The other differences are non-significant. These results suggest that PLT improves productivity in the generation of Product Functions, including original functions (e.g. "be recyclable", "be resistant to chemical substances"...) which could drive the innovation process.

For fairly interpreting the abovementioned results, we should mention that the total duration of the working sessions in the three conditions was 60 minutes, including the instructions. In this respect, Persona and PLT methods might be a bit at disadvantage compared to EPMcreate, given the time necessary to read the personas. Indeed, reading of the four Personas takes about 10 minutes in the working session. In the EMPcreate condition, without this preliminary phase, more time was allocated to requirement generation. If we transform the data so that the time for requirement generation is equivalent in all conditions, the results change: PLT appears globally more efficient than the other methods (p=0,043) (figure 5).

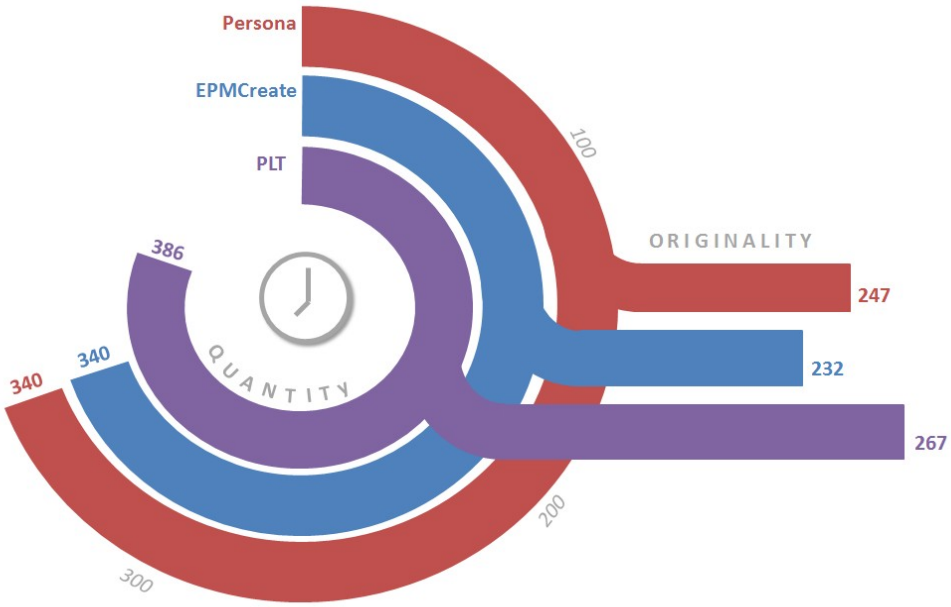

Figure 5. Transformed data about Quantity and Originality.

CONCLUSION

We have created a method particularly efficient for multidisciplinary design teams, that is using two kinds of reasoning: empathetic thinking and logical thinking. To test the efficiency of our new original method (PLT), we carried out experimentation with three conditions ("Persona", "EPMcreate" and "PLT" conditions). Participants had to generate the requirements of future users of tablets in the field of education during 60-minute working sessions. These requirements were classifies as User's Needs, Product Functions and Technical Solutions. Our preliminary results show that our method seems promising to support the innovation process. "PLT" allows designers to anticipate user requirements in the fuzzy front-end of a design project, before validating and extending use analysis with end-users. We are now investigating PLT performance as assessed by end-users, by having them rate the usefulness of the requirements that were generated in this study. Finally, our method was fairly well welcomed by designers (4/5 on satisfaction scale).

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