Eliciting Mental Models of User Methods for Product and Communications Design

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Abstract. In order for products and services to be designed inclusively, designers need to understand users' capabilities and needs Thus methods for involving and understanding users are of key importance for inclusive design. However, many of these methods have limited uptake, possibly because of a poor fit with design practice. We conducted a card-sorting study with twenty-one product and communications designers, examining how they view user-centred methods, and how they relate them to other design methods. Results were analysed using hierarchical agglommerative cluster analysis to try to identify groups of methods that are considered similar to each other. This paper particularly examines the differences between product and communications designers. We found that product designers perceive a larger distinction between user involvement and other design methods, and communications designers are less structured in their approach to methods. We conclude that inclusive design methods and their presentation need to be adapted for different groups of designers.

Keywords: Inclusive design, user methods, design practice.

1 Introduction

In order to design useful and usable products and services inclusively, designers must keep in mind the end-users' needs, capabilities and desires [1]. This is especially important in inclusive design because the users have a wide range of capabilities and situations, which are often very different from the designer's own [2, 3]. However, doing this can often be difficult. Therefore, many methods have been developed to support this, including both methods for involving users directly and ones for helping designers to consider and understand users more remotely.

However, many of these methods have had a mixed and limited uptake in design practice [4, 5, 6]. Our previous research [3] identified various possible reasons for this, particularly a poor fit between many of the methods and the ways in which designers think and work (c.f. [4, 5, 13]).

In order to improve the uptake of user methods, it is therefore important to understand more about design practice, particularly about how designers think about design methods. We therefore conducted a card-sorting study to investigate designers' views

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of design methods, particularly examining how user methods of various types fit into this picture. This was part of a larger study which examined design practice more generally, with the aim of understanding how best to equip designers to carry out inclusive design. The larger study indicated differences between product and communications designers in how they approach and carry out design [7, 14], and the card-sorting study indicated that these differences also affect the ways in which they view design methods. In this paper, we focus on these differences and their implications for developing and disseminating inclusive design methods to these communities. Some initial results from this study, examining the sample as a whole, were previously published in [8].

1.1 Related Work

Other researchers have also investigated the use of user methods in design, describing what methods are or are not used and for what purposes (e.g. [9, 10]). Informal approaches appear to dominate [11], with more formal user research often being constrained by limited resources and difficulties in applying the research results [9].

These findings describe the kinds of user methods that are commonly used, and some of the reasons for this, but they do not examine how the designers themselves perceive the methods. Some researchers have addressed this by asking designers to explain the reasons for their use (or non-use) of methods (e.g. [9]) or to rate a selection of methods (e.g. [10]). This provides some useful insight into designers' perceptions of the methods, but does not tend to examine their underlying assumptions about them. In addition, some of the studies focused on relatively small selections of methods.

We therefore sought to augment the previous work by examining designers' underlying views of a wider range of user methods. The study aimed to uncover more about designers' underlying perceptions of the relationships between different design methods, and of the roles played by user methods in particular.

2 Method

Over 330 design methods and techniques were identified through a literature review of fields such as product design, HCI and ergonomics. A subset of 57 methods was then chosen. Care was taken to ensure a representative range of method types, and a wide selection of methods for understanding and involving users. Each method was then described on a card, as shown in Fig. 1.

The card set was given to fourteen product designers and seven communications designers. The product designers had between 1 and 27 years of design practice experience (mean 8), and the communications designers had between 2 and 20 years of experience (mean 11.5). They were asked to organise the cards into groups using any criteria they liked and with any number of groups and sub-groups. Care was taken to avoid influencing the judgments. They then labelled these groups, as shown in Fig. 1. By allowing the designers flexibility in grouping and labelling the methods, we aimed to uncover their perceptions of design methods and the considerations that they felt were important in categorising them.

Fig. 1. An example card and a completed card sort

The results were analysed using cluster analysis; an exploratory multivariate statistical technique that is traditionally used to group and classify subjects or variables. By using iterative numerical methods of classification, it is possible to extract the underlying structure in data without any prior assumptions. Clustering methods are primarily descriptive and exploratory in nature [12]. They were used in this study to identify groups of methods that participants considered similar to each other, thus uncovering common perceptions of the relationships between the methods.

In order to identify differences between product and communications designers, these two sub-samples were analysed separately. Hierarchical agglomerative cluster analysis was used on the probabilities of methods co-occurring in the same sorting groups. The resulting probability data were clustered in SPSS using the squared Euclidian distance measure, and a number of agglomerative clustering algorithms or linkage rules run: (1) complete linkage (furthest neighbour) and (2) Ward's method. The results of these analyses were compared for agreement and examined to identify stable clusters and sub-clusters of methods. The output was then collated in the form of clustering dendrograms, which are graphical representations of the clustering process. These were then named by the researchers, based on the methods within each cluster. In some cases, there was no clear connection between the constituent methods, so they were given labels such as "Other" (see Figs. 2 and 3). Wards's method was chosen as the best method for characterising the data, and the resulting clustering dendrograms using this method are shown in Figure 3. It should be noted that figure 2 and 3 represent the main hierarchical cluster relationships in a simpler visualisation and do not reflect an arbitrary choice of clusters. In fact, no cluster choice has been made; the results presented represent the strong evident grouping of the data. Unstable peripheral group members across the two methods were simply omitted.

3 Results

3.1 Product Designers

The clusters of methods used by the product designers are shown in Fig. 2. Both the clusters and the relationships between them were extremely stable, indicating that the product designers held a strong common view of design methods. Because the relationships were stable, the diagram has a detailed hierarchical structure, showing how the clusters are related to each other.

3.2 Communications Designers

The clusters of methods used by the communications designers are shown in Fig. 3. As before, the clusters were stable; however, the relationships between them were not. As a result, only a limited amount can be concluded about the relationships between the clusters, and the resulting cluster structure shown is relatively undeveloped.

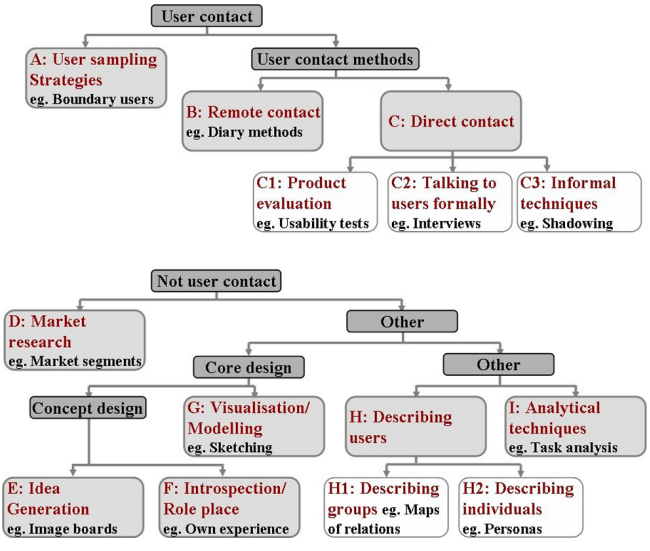

Fig. 2. Common clustering pattern of methods for the product designers in the study. The main clusters are indicated by light grey boxes, and sub-clusters by white boxes. Dark grey boxes indicate how the clusters are related to each other; labels on them are tentative.

In addition, the communications designers identified a large cluster (H, with 14 out of the 57 methods), containing a wide range of methods. Almost all of the communications designers scattered the methods in H across several groups. This indicates that H does not represent a coherent cluster, but rather a set of methods inconsistently categorised across the sample.

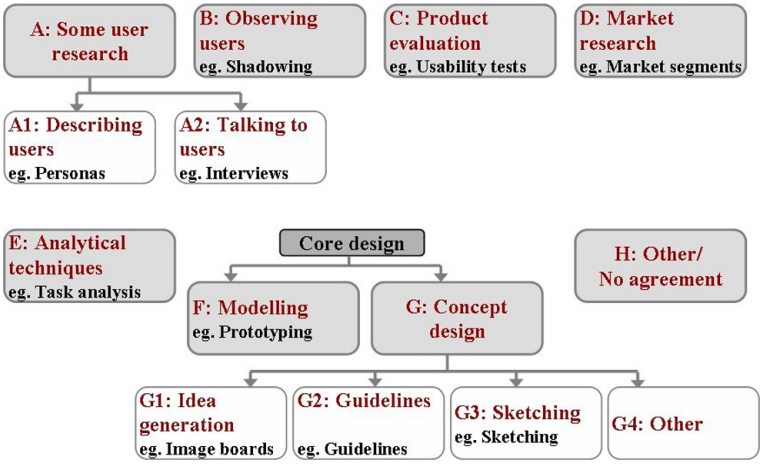

Fig. 3. Common clustering pattern of methods for the communications designers in the study. The main clusters are indicated by light grey boxes, and sub-clusters by white boxes. Dark grey boxes indicate how the clusters are related to each other; labels on them are tentative.

4 Discussion

Both product and communications designers identified clear clusters of design methods. Furthermore, some of these clusters were similar: Product evaluation (clusters C1 and C), Market research (D, D), Idea generation (E, G1) and Modelling (G, F) contained similar methods for both product and communications designers. Both kinds of designers also identified clusters for Describing users (H, A1) and Analysis (I, E), although these only shared a third to a half of their members. Both also identified a higher-level group of "Core design" methods, containing Modelling and several Concept design methods, particularly methods for Idea generation.

However, communications designers had fewer consensuses about design methods, with several of the methods being inconsistently categorised across the sample. Moreover, product and communications designers differed in their views of the relationships between the clusters. Product designers had a common, detailed view of how the clusters were related. Communications designers, on the other hand, did not tend to agree about this, as shown in the flat structure in Fig. 3. Thus, although communications designers have some shared understanding of design methods, this is much weaker than for product designers. The shared understanding does not cover all methods, nor does it extend to the relationships between groups of methods.

The two kinds of designers also differed in their perceptions of user involvement. The product designers had a clear, top-level split between methods with and without user contact. In contrast, although the communications designers had some clusters of user contact methods (A2, B and most of C), these clusters did not group together, and several user contact methods were located in H (Other/No agreement).

We conclude that within the constraints of the small sample, designers tend to think of user contact methods separately from other methods, but this tendency is much stronger for product designers than communications designers. In fact, product

designers see user contact as the key discriminator between types of design methods, while communications designers mix several user contact methods with other methods in cluster H and (to some extent) cluster B.

5 Implications

Despite several similarities between product and communications designers, it is clear that they do not view design methods, particularly user methods, in the same way. In particular, product designers perceive a much larger distinction between user involvement and other design methods, and communications designers have less consensus and structure in their approach to methods. As unequal numbers of product (14) and communication (7) designers were involved in this study it is necessary to consider whether the different numbers of each type of designer may have had an impact on the results. For example, it is possible that the outcome may have been different if the number of designers of each type were equal.

This has implications for developing and disseminating inclusive design methods, particularly ones for involving users. It indicates that different design disciplines will respond in different ways. Methods that are suited to one group may need to be adapted or presented differently before they are accepted and used by another group. Although communications designers may benefit from a more flexible approach that allows them to examine method sets in a variety of ways it is also possible that they may really need more guidance on whether and how users are involved. Our results indicate that product designers would benefit from a structured presentation of inclusive design methods and clear guidance on whether and how users are involved. It would also be helpful to place new user methods within the designers' existing conceptual framework. In contrast, communications designers may benefit from a more flexible approach that allows them to examine method sets in a variety of ways and makes less distinction between user methods and other design methods. The framework being developed in the next stage of this research will help to address these issues.

6 Further Work

The results of this study are being used to assist in constructing a framework to help designers to think about methods for inclusive design and to choose ones that are appropriate for their needs.

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