Creating Visual Tools to Support Human-Centered Design Methods

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Abstract—Visual tools, such as illustrations, are increasingly being used as part of Human-Centred Design (HCD) methods (e.g., during the requirements gathering phase). However, many HCD practitioners, who do not have visual communication design skills, often find it difficult to determine which existing visual tools to use, or how to create new tools for their own design projects. As such, it is becoming necessary for HCD practitioners to work with visual communication designers to co-create visual tools for specific projects. Here, we provide a multidisciplinary design approach to guide the process of co-creating such visual tools. We also discuss the use of this process in a case study, which has required creating visual tools for field interviews.

Keywords—Visual tools, visual methods, visual design, human-centered design, co-design, field research.

I. INTRODUCTION

Visual tools (also referred to as visual material) are commonly used in conducting qualitative research [1]—for instance in ethnographic research, which tends to take a holistic approach and aims to understand different aspects of people’s lives by observing what people actually do, instead of what they say they do, or what others say they do [2]. Visual tools are used in such research methods, for example, to evoke comments and feedback from informants in interviews, to produce visual records, or to observe ways of seeing and understanding [3]. The use of visual methods, for instance through photo-diaries and photo-elicitation, are particularly valuable when, for example, interviewing younger people [4], [5] or dealing with sensitive topics [6].

Many of these qualitative research methods—utilizing visual tools—are also used in different phases of the Human-Centered Design (HCD) process. Examples of these methods include, for instance, different types of interviews or focus groups conducted to gather user requirements during the discover phase (Figure 1) of the Double Diamond design process [7]. Similarly, IDEO [8], for example, encourages the use of visual tools during the process of self-documentation by design participants.

However, most HCD practitioners are not professionally trained Visual Communication (VC) designers, and as such, they generally lack the necessary skills to create suitable visual tools to use in their individual design projects. Therefore, they usually tend to use existing or found tools, which may be far less than ideal for the specific needs of a particular project. Furthermore, it is often difficult for HCD practitioners to simply ask VC designers to produce such visual tools, without collaborating closely with VC designers, who are not likely to have the necessary HCD background to fully understand the HCD requirements.

In this paper, we propose a collaboration process between HCD practitioners and VC designers to co-create visual tools which can be used by HCD practitioners in their specific design projects. While here we mainly discuss creating visual tools to be used in field interviews (e.g., as part of requirements gathering during the discover phase of a service design process), the co-creation of visual tools to be used in other stages of the design process using other methods can follow a similar approach.

II. A TYPOLOGY OF VISUAL TOOLS

A mentioned, a wide range of visual tools have been designed and used in qualitative research—many of which are also adapted and used in HCD processes. Consequently, it is challenging for researchers and practitioners to determine what type of visual tools to use in their projects. Glegg [10] proposes a typology that arranges visual tools into five categories according to their use purposes:

1) to enable communication,
2) to represent data,
3) to facilitate relationships,
4) to enhance data quality and validity, and
5) to affect change.

While this typology is also useful for HCD purposes, there are a number of points to keep in mind when adapting it for HCD use. Firstly, there are some overlapping functions for visual tools in Glegg’s typology, especially between categories 1 and 3. For instance, while the function “develop rapport” is included in category 3, it is also...
important for improving communication (i.e. category 1). Secondly, Glegg’s suggestion that applying the typology relies solely on the researcher’s perspective, ignores the fact that, for our purpose, HCD practitioners often work within interdisciplinary teams—not to mention that here we also are proposing the need for them to collaborate with VC designers as well.

With these points in mind, we have adapted and modified Glegg’s typology, and will use it in this paper to demonstrate how visual tools could be co-designed for our example case of filed interviews. A typical field research in the discover phase of a project consists of three stages:

1) before the field research: review of existing literature, planning, etc. takes place,
2) during the field research: a series of interviews are conducted to gather the necessary information, and
3) after the field research: the interview data is analyzed and reported in some form.

A such, the aims of using visual tools can be classified under three groups according to different stages of the field research. By employing various visual tools in the three stages of field research, HCD practitioners can aim to: 1) support secondary research, 2) formulate research outline, 3) facilitate communication, 4) engage participants, 5) elicit comments and foster ideas, and 6) construct knowledge and create impact. While the use of visual tools for all these tasks is important, we have primarily focused on tasks 3–5 (i.e. those related to the second stage of the field research—the field interviews themselves).

III. CO-DESIGN OF VISUAL TOOLS

Figure 2 depicts the iterative process between HCD practitioners and VC designers that must be supported during the co-design process. In this process both parties work together on:

1) brainstorming ideas,
2) creating visual prototypes, and
3) iterating, testing and refining prototypes to create the required visual tools.

Moreover, VC designers and HCD practitioners can advise each other based on their own expertise. For instance, since HCD practitioners would generally have deeper insights about the cultural or socio-political context of their design project, they can provide advice to VC designers on the environment in which the HCD participants live or the customs they might have, so that VC designers can produce ethically, culturally, or socio-politically appropriate tools. It is also crucial for VC designers to receive feedback from HCD practitioners in order to ensure that the tools meet the field research requirements. VC designers, on the other hand, can for instance recommend a particular visual style or content that are suitable for the design project, thus ensuring that the production is feasible within the time and resource limitations. Furthermore, VC designers can also make the visual tools physically tangible by suggesting materials and methods used in production based on their previous experiences with digital and printed media.

To support these types of interactions, we propose a co-design process consisting of four stages:

1) define the requirements of the visual tools,
2) choose an appropriate visual style,
3) create visual prototypes, and
4) iterate, test and refine.

Below, we discuss each of these stages using a case study example involving field interviews in Bihar, India. The first author created the necessary visual tools for this project, while working as a VC designer with several HCD researchers, who subsequently used the visual tools to conduct their interviews (see also, [11]).

A. Define the requirements of the visual tools

The objective of the field interviews was defined as exploring the lives of females (aged 10–22) who are in a transition from girlhood to womanhood and post-marital life in Bihar. Two important factors had to be taken into account in designing the visual tools: 1) the research participants were not exposed to widespread internet usage, and they were not familiar with digital devices—so the visual tools needed to be physical and tangible, and 2) the interviews would include questions about sensitive topics (e.g. puberty and sex)—so the visual tools had to minimize possible harm or negative influences on the research participants.
The goal of the visual tools was to prompt dialogue with research participants who are at different stages of their lives. In addition, the visual tools needed to incorporate another existing visual tool, called the Life Course tool, which is a timeline on a piece of textile that maps out critical transitions in a woman’s life (see, bottom left of Figure 3).

For this project, several proposals arose from a brainstorming session, including: the use of the game of hopscotch as a design research tool, the use of a visual diary as a method, and the use of paper dolls as visual tools. After the evaluation of different concepts, it was decided to create the visual tools based on the concept of the paper dolls. This set of visual tools would initially contain a doll representing a young girl, several types of outfits, various objects, and a large board of different environment settings (e.g. a school).

### B. Choose an appropriate visual style

Different visual styles and illustration techniques should be taken into account before designing the visual tools. Since for this project the company involved already had its own brand colors, the selection of colors was not discussed extensively, and the primary focus was on determining the most effective form of visual representation.

McCloud [12] proposes a triangular diagram (Figure 4) to describe how to place various types of representations on a visual map. The diagram starts from the point of “Reality” and stretches out along two directions: 1) Iconic abstraction which leads to “Meaning”, and 2) Pure abstraction which leads to “The Picture Plane”. It was decided that the visual representation of the paper dolls should follow the axis of iconic abstraction, because the visual tools must be understood by both the HCD practitioners and the research participants sharing a common meaning. However, it was crucial to decide whether the paper dolls should be drawn in a more realistic or a more abstract manner. Initially, existing photographs from previous field trips were used to test the concept of representational images. These photos, either found online under public domain or taken by the research team from previous field trips, were printed and cut to separate pieces. Different parts were put together to depict objects and settings. However, such realistic images are highly specific and contain a great deal of irrelevant information, which can be challenging to edit and remove. In addition, very realistic images lack the sense of substitution [12]—thus making it harder for research participants to associate the images with their own life experiences.

Figure 5 shows an example of the process of image abstraction which was followed to create an illustration based on the photograph of a real Hindu temple in Bihar. The goal was to depict a generalized place of worship for those research participants who follow Hinduism. The process consists of three steps:

1. summarize shapes and configurations (e.g. the temple is a structure with two towers and a chamber with two doors),
2. remove irrelevant details (e.g. decorative elements are removed), and
3. preserve distinctive features (e.g. the unique shape of the door, and the five layers of the towers).

This process was followed for creating all the visual tools, specially the different environments (e.g. temples, mosques, schools).

### C. Create visual prototypes

Prototyping needs to be a co-creation activity, involving both HCD practitioners and VC designers, so that the HCD practitioners who are the actual users of the visual tools can have an opportunity to provide feedback to VC designers, while at the same time the VC designer can suggest feasible production methods, suitable tools, etc.
Several prototypes were created during our example case project, before the final design was selected and produced. These ranged from low-fidelity prototypes (e.g. the collage of photographs mentioned earlier), to high-fidelity prototypes produced after the completion of early illustrations. During the prototyping, the team agreed on some key elements of the paper dolls and the possible usage scenarios for them. A number of criteria, based on the framework proposed earlier, were taken into account when prototyping the visual tools.

Figure 6 shows different elements of the visual tools that were created: a paper doll, different outfits, and multiple environment cards. The paper doll is the main component of the visual tools. It can represent a persona based on real-life settings of the research participants, and by building narratives around the doll, participants can associate their experiences with the chosen doll persona, and share their own stories. Different sets of clothes, including a saree, kurta, school uniform, and western clothes, can be used to represent different transition points in the life course of the doll’s persona. The outfits also have paper handles to allow attaching them to the dolls.

The paper doll, along with the outfit, can be placed on different backdrops (environments), such as schools, mela (local fair), local market, health facility, place of worship, the field, and home. These environment cards allow researchers to construct more specific narratives and ask focused questions. During the prototyping, it was unclear whether the environment cards should be separated into specific scenes, or they should be illustrated together as a whole scene.

D. Iterate, test and refine

As with most HCD processes, creation of visual tools should also follow iterative cycles of testing and refining. In our case example, the iterations allowed testing different options in terms of combining the visual tools with the Life Course tool (see, Figure 3). These included: 1) discarding the original Life Course tool entirely and incorporating it into a large playmat, 2) keeping the Life Course tool, but instead of having individual separate environment cards, include all of them on the playmat itself, each on a fixed spot, and 3) keeping the Life Course tool, and using a playmat with a set of environment cards, so that every component was flexible and could be arranged accordingly for different cases. At the end, option 3 (see, Figure 7) was chosen due to its simplicity and flexibility.

Furthermore, through this iterative process, it was discovered that one single doll could not represent all age groups and various stages of of a participant’s life—since, for example, Indian females have distinct hairstyles at different stages of their lives or different occasions (see, Figure 8).

It also became necessary to add various supplementary characters, including a teacher, an accredited social health activist (ASHA), a health worker, an Anganwadi (rural child care centre) worker, a mother, a father, a sister, a grandmother, and a husband. The other visual features of these professional characters were kept unspecified, to allow the participants to attach different meanings to them.

IV. EVALUATION OF VISUAL TOOLS

The visual tools presented here have been used in 19 field interviews in India (see, Figure 9). These included several
types of interviews, ranging from focus group discussions, to key informant interviews, in-depth interviews, and inter-generational interviews. A diverse group of participants were engaged in the interviews, including unmarried girls of different ages, recently married women, mothers of unmarried girls, and grandmothers. The visual tools were used in all the different sessions, either as a whole set of visual tools or as separate individual tools.

An evaluation of the effectiveness of the visual tools was conducted with the HCD practitioners conducting the field interviews and their participants. An interview questionnaire was sent to 8 researchers who were engaged in the field research project. In addition, feedback from the participants was gathered using the transcripts of responses to questions the researchers asked the participants about their comments regarding the visual tools at the end of the field interviews.

In general, researchers agreed that the visual representations of the tools were culturally and contextually appropriate, and they represented the people and settings in Bihar well. In particular, the visual tools balanced appropriate
imagery, context, cultural sensitivity, and inclusion. One researcher also mentioned that the use of familiar patterns and images created the feeling of calmness in the participants, as they were able to recognise the settings they are used to.

The researchers were asked to rank how successful the different aims of applying visual tools were as presented in the framework proposed earlier. Figure 10 shows a comparative ranking of the various purposes under three main categories: the visual tools aimed to support. In summary, the participants were pleased with the visual tools, and the tools helped the researchers to reduce communication barriers, and evoke more detailed data by building and sharing narratives together with the participants.

However, the researchers also noted that the visual tools were rather complex, which made them difficult to carry and assemble together during the interviews. Moreover, in order to utilize the visual tools effectively, a strategy on how to use the tools should be developed. This type of strategy would define the method of use for the visual tools during interviews in field research.

V. Conclusions

In this paper we have presented a multidisciplinary design approach to allow HCD practitioners to work with visual communication designers in co-creating visual tools which could be used as part HCD methodologies.

Furthermore, we have demonstrated how this co-creative design approach has been used in a real-life case study. While the evaluation of the resulting visual tools has demonstrated the effectiveness of the process of designing the visual tools, there are a number of areas in which the visual tools themselves could be improved.

As part of future work, it would be valuable to test our proposed multidisciplinary design approach for co-creating different types of visual tools to support other HCD methods, such as contextual enquiry.

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References


