2018-10-21

Health Visualizations at Home: Who Sees What Where

Aseniero, Bon Adriel; Tang, Anthony; Carpendale, Sheelagh

University of Calgary

Aseniero, B. A., Tang, A., Carpendale, S. (2020). Health Visualizations at Home: Who Sees What Where. University of Calgary, Calgary, AB.
http://hdl.handle.net/1880/112377
conference poster

Health Visualizations at Home: Who Sees What Where

Bon Adriel Aseniero*, Anthony Tang†, and Sheelagh Carpendale‡
University of Calgary

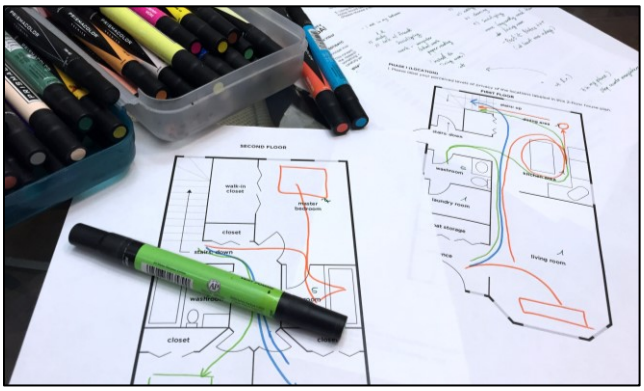

Figure 1: In this pilot study, we asked our collaborators to illustrate their answers in sheets containing a house plan.

ABSTRACT

We conducted a qualitative study pilot to gather requirements for integrating health visualizations at home. We focused on finding dynamics between (1) *people*: who the visualizations are made for, and others who will see them; (2) *visualization*: what visual representations people expect for their homes; and (3) *location*: where people expect to find the visualizations. We describe our study methodology and the results. We found hints of concepts for consideration such as (1) privacy can be derived from visualization style, (2) visualizations can be installed at high traffic locations but data sensitivity should be considered, and (3) location of related tools at home can influence where visualizations should be located.

Keywords: Personal visualization, situated visualization, home.

1 INTRODUCTION

There is a current shift in information visualization (Infovis) use as more people embrace and encounter visualizations in their daily lives. New adopters of visualizations have different motivations for using such tools, ranging from simple interest or novelty, to self-improvement [1]. Rather than focusing on task optimization, these people are more concerned with the *visual quality* of their visualizations, typically using them during their personal time and/or at home. Thus, the aesthetics of a visualization is important when designing for this type of situated visualizations [2]. This becomes more important as more visualizations are used in the home. Previous work suggested that aesthetics are linked to context of use, which informs the design of home visualizations for energy usage feedback [3]. Our work extends and applies this research into personal health visualizations for the home. We conducted a qualitative study pilot in order to explore three home-integration factors: (1) the *people* in concern, (2) the type of *visualization* and the data it represents, and (3) the *context* of the location in which the visualization appears in the home. In our pilot study, we gained preliminary insight into the dynamics between these factors, finding out where the visualizations should appear within the home and what types of visual representation should be considered.

2 THE PILOT STUDY

For this pilot study, we asked two of our collaborators, Tamara Flemisch and Terrance Mok, to act as our participants. We asked them to fill-in a demographic questionnaire, after which we interviewed them about their current living situations, as well as any concerns or goals about their health and wellness. At the time of the pilot, Tamara was a master student in Infovis, while Terrance was a master student in human–computer interaction but was only familiar with basic visualizations. In addition, each offered insights into their own, quite different home dynamics. At the time of the pilot, Tamara lived in a *shared apartment* with other housemates, while Terrance lived in a *single detached house* with his spouse.

The interview was divided into three phases with each phase focusing on one of the three home-integration factors. The main questions in each phase involved tasks where our collaborators marked their answers on a provided floor plan (Figure 1). The floor plan was a sheet which contained an illustration of a hypothetical house layout. It used standard architectural symbols to show layout for walls, doors, windows, and other household fixtures (e.g., sinks and toilets). It was modelled from a typical housing layout of one of the neighbourhoods in the city where we conducted this study. We opted for a hypothetical house plan because this helped protect our collaborator's privacy as they may not wish to fully divulge information about their homes. It also allowed us to use a given layout for each collaborator's home, which could later be used for comparing between collaborators.

During the first phase of the interview, we asked our collaborators about their perceived privacy of locations within their homes. Their first task was to label the different locations in the floor plan with the level of privacy they expected it to have. The levels ranged from 1 to 5, with 1 being the least private (i.e., spaces to which people have access and where they gather regularly regardless of whether they live in the house or are guests) and 5 being the most private (i.e., spaces to which only specific people have access). Next, we asked them to draw typical paths taken by certain people (e.g., a housemate, a guest, and the collaborators themselves) around their house. Each path were represented by different coloured markers. We also asked the collaborators to give examples of items found and the activities that happen in the locations.

During the second phase, we gave the collaborators examples of health data grouped into two categories: less sensitive fitness data (e.g., step counts, and weight) and more sensitive medical data (e.g., blood test results, chronic illness assessments, etc.). We asked them to mark the areas of the home where they would like to see these data. However, we did not yet tell them of the visualization or representation that would be used to show the data.

* email: baasenie@ucalgary.ca
† email: tonyt@ucalgary.ca
‡ email: sheelagh@ucalgary.ca

The final phase involved questions about the different representations (visualizations) that people would like to see in their homes. To give the collaborators an idea of what data representations are available to them, we briefly introduced them to Vande Moere et al.'s three styles of visualizations: *Analytical style* such as traditional bar graphs and charts, *Magazine style* or aesthetically appealing visualizations that can still be used for analytical tasks, and *Artistic style* or unconventional visualizations that have "compelling visual forms" such as flowers, etc. [4]. Afterwards, we asked them to choose which visualization style(s) they would like to see within the different locations of their home.

3 Results and Discussion

Through open-coding analysis of our pilot study results, we derived the following concepts to consider when designing health visualizations for the home:

1. *Privacy Derived from Style* – Tamara and Terrance both gave similar privacy levels for the locations on the hypothetical floorplan (see Figure 2). They both placed the less sensitive fitness data in less private locations, while placing more sensitive medical data in more private locations. They preferred to have analytical style visualizations in private areas because they can be easily read. However, when we first introduced them to the artistic visualization style, they both thought that the representations did not contain data. Thus, they stated that they would place some sensitive data in less private areas of their home if the representations used are incomprehensible to those who are unfamiliar with the visualization. This hints that some visualization styles can add a layer of privacy.
2. *Visualizations in High Traffic Locations* – Tamara and Terrance placed all visualization styles within the kitchen and dining area which had the highest traces of people coming in and out (including guests). This hints that high traffic areas may be a good location to place visualizations in, as visualizations in these areas will be seen more often by people which could prompt a change in their behaviour. This is reminiscent of Bartram et al.'s [3] findings on integrating homes with visualizations of energy consumption in which one of the requirements included *ambience*, where people always saw their data in the periphery. Sensitive data should still have some form of privacy which can be designed in the visual representation (see *concept 1. Privacy Derived from Style*).
3. *Tool Location* – The location of certain tools and items at home can dictate where people perform activities related to their health and fitness. This hints that relevant visualizations should be installable where they perform these activities, or where their tools are located. For example, Tamara marked the laundry room as a place to view fitness data because her weighing scale is located in that room and she wanted to be able to correlate her weight data with her other fitness data. She also placed medical data in the kitchen because she checks what she eats in relation to her health.

4 Future Work and Conclusion

Currently, this research is a work-in-progress and the results are not generalizable. One limitation is that the study used a hypothetical house plan which may not be close to the real layout of our collaborators' homes. One approach is to let them draw their own layouts, however, we are already planning on conducting this research in real people's homes. In our next steps, we will seek to confirm and update the concepts we found by recruiting participants with diverse living conditions and cultures. We will also bring visualization prototypes (both screen-based and physical) and let the participants place them as they wish around their house. Our aim is to get a sense of issues at play in real home settings.

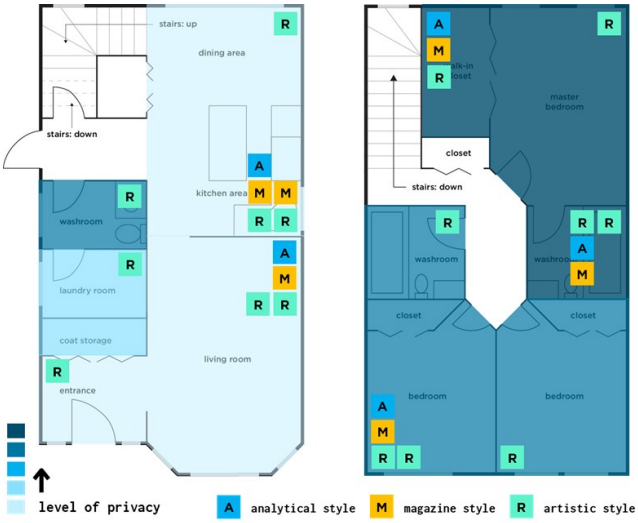

Figure 2: The distribution of where the participants wanted the different visualization styles at home. Darker areas are locations with higher privacy.

Regardless of its limitations, the pilot gave us preliminary insight into some of the dynamics of people, visual representation, and location. As with previous research, we found hints that visualizations should appear in areas of the home where people congregate. This allows people to see their data often so they can learn from it. However, the sensitivity of the data has to be taken into account. To place such data in less private spaces, its visual representation can be designed using a style that is not immediately readable to others. For this, artistic visualizations can be useful as they provide adequate privacy from those unfamiliar with the representation, while also being visually pleasing like a home décor. Furthermore, we found hints that the location of visualizations at home can be chosen by linking visualizations with related tools. A visualization may be most useful if it is present where activities related to its data are happening. Our pilot study suggests that there is a wealth of insight to be gained by qualitative requirements studies for designing the use and placement of visualization in the home.

5 Acknowledgements

We would like to thank Tamara Flemisch and Terrance Mok for their contributions as our pilot study collaborators. This research was supported in part by Alberta Innovates Technology Futures (AITF), Natural Sciences and Engineering Research Council of Canada (NSERC), and SMART Technologies.

References

[1] D. Huang *et al.*, "Personal Visualization and Personal Visual Analytics," *IEEE Trans. Vis. Comput. Graph.*, vol. 21, no. 3, pp. 420–433, Mar. 2015.

[2] A. V. Moere and D. Hill, "Designing for the Situated and Public Visualization of Urban Data," *J. Urban Technol.*, vol. 19, no. 2, pp. 25–46, Apr. 2012.

[3] J. Rodgers and L. Bartram, "Exploring Ambient and Artistic Visualization for Residential Energy Use Feedback," *IEEE Trans. Vis. Comput. Graph.*, vol. 17, no. 12, pp. 2489–2497, Dec. 2011.

[4] A. Vande Moere, M. Tomitsch, C. Wimmer, B. Christoph, and T. Grechenig, "Evaluating the Effect of Style in Information Visualization," *IEEE Trans. Vis. Comput. Graph.*, vol. 18, no. 12, pp. 2739–2748, Dec. 2012.