Designing For and On Wall-Sized Displays: a Preliminary Study with Figma

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***Abstract*—Wall-Sized Displays (WSDs) have several spatial characteristics that are difficult to address during user interface design. The design at scale 1:1 could be part of the solution. One designer explored the feasibility to use a well-known prototyping tool, Figma, on two different WSDs, by relying on three different interaction methods: touch, a keyboard and touchpad, and a tablet. We observed that designing at scale 1:1 was appreciated and that interaction with the tablet proved to be the most comfortable interaction method, but Figma seems not adapted for this usage.The physical environment also had an impact.**

***Keywords*-wall-sized display ; design ; figma ; large scale display.**

I. Introduction

Wall-Sized Displays (WSDs) are also referred to as vertical Large Interactive Displays (LIDs) or Large High-Resolution Displays (LHRDs). However, the notion of 'large' is not defined and can be subjective [1]. Belkacem et al. defined a LHRDs as a display that "*creates a coherent physical view space that is at least of the size of the human body and exhibits a significantly higher resolution than a conventional display*" [2]. According to Chen et al., WSDs improve user performance and satisfaction for tasks, such as model design, analysis, and visual data mining [3]. However, these new ways of viewing, collaborating and interacting differ from desktop and smartphone applications [1], because of their size, their resolution, the collaboration they foster, and the so-called *natural* interactions used (mainly tactile and gestural) [4]. Several papers have voiced the challenges posed by WSDs [1] [2] [5]. As a result, it remains a challenge to support designers with the right tools and methods for designing applications for WSDs. The design of these kinds of systems raises several questions regarding the User Interface (UI).

In this paper, we seek to address the *designer support* challenge, i.e., the need for design and testing tools and methods [1] [5]. Therefore, we look into the design of a UI prototype and seek to understand whether an existing online design tool can be used to prototype UIs in the WSD environment at 1:1 scale. With 'UI prototyping', we mean the prototyping of interface, functionalities, screen layouts and behaviors at the mid-fidelity level. We seek to understand whether a popular UI design tool, Figma [6] can be used to prototype UIs in the WSD environment at 1:1 scale.

Related work about methods and tools to prototype for WSDs are reported in SectionII, then the study is described in Section III, the results are presented in Section IV and discussed in Section V.

II. Related work

Several tools and methods have been proposed in the literature to support design for WSDs. The interest of **Paper prototyping** [7] is to explore, communicate and evaluate early interface designs with end-users or within the design team. In this case, a designer often plays the role of the computer to simulate the behavior of the system by changing the pieces of paper shown to the participants. A number of studies have used paper prototyping to design applications on a WSD (e.g., [8] [9]). Another option is the use of **role play** and actors to prototype and test interactions with the WSD. For instance, Avellino et al. asked actors to act out some interactions and played them back during tests with participants to simulate a controlled remote collaboration situation on a WSD [10]. Furthermore, **prototype development** is a common practice [11], but there is no indication on how the applications were designed (e.g., [12] [13]). Finally, **mixing mock-up techniques** exist, which are mainly used to prototype ubiquitous computing systems, but can be also used to mock-up WSDs. For instance, *Mini-studio*, which consists of a physical paper model of the system and projection of the content, could be used to prototype for WSDs [14]. Another system is *SketchStudio*, a 2.5D (devices in 2D and characters in 3D) animated scenario design tool for rapid prototyping of systems involving multiple users and multiple components or devices [15]. These methods and tools advantage is that they also enable the interactions to be played around the WSDs. However, they are not accurate enough for a prototype of the screen layout and content, especially in contexts where large amounts of data and high resolutions are required [2]. Overall, the prototyping method is frequently used for designing WSD applications, but how the design was achieved is usually not described. In those cases it is documented, paper prototyping is the most widely used method. We did not find any studies covering the design of a UI prototype on a WSD at 1:1 scale.

III. Study

Prototyping for WSDs in actual size, directly onto the targeted support, could reduce complexity, give a sense of scale, and ensure that the target resolution is correctly achieved and exploited. It could also help to check the visibility of the designed UI at various distances and viewing angles [2] [5]. But, as noted by Lischke et al., "*[it] is often not possible to prototype in the original size*" [1].

A. Research question

To study the design at scale 1:1 on a WSD, we decided to use Figma, a mid-fidelity web-based prototyping tool. The research question addressed by this preliminary study is: **can Figma**, as a desktop optimized tool, **be used in a WSD environment to design at 1:1 scale?** What are the problems and the opportunities arising from using Figma to design a UI for, and directly on a WSD ?

B. Protocol

Figma was tested on a WSD by one designer under several experimental conditions: two WSD settings (WSD-IA, and WSD-VW) with different physical conditions, and three different interaction methods: a Bluetooth keyboard with a touchpad, direct touch on the WSD, and a synchronized tablet. The **participant** was an expert in UI design and has participated in the design of several UIs for WSDs, but had never used Figma before. She was free to stop the experiment whenever she wanted (e.g., when it became too difficult) or when having finished the design. Since this preliminary study's aim was to verify the feasibility of using Figma under these conditions before carrying out more in-depth studies, we judged that only one user was necessary.

The **system** consisted of a touch WSD displaying Figma in the Chrome internet browser in full-screen mode. Two WSDs were used: WSD-IA (curved, diameter: 3.64m, height: 2m, composed of 12 4K screens in portrait mode, 8 of which are touch-enabled using infrared frames, completed by a height-adjustable table and a keyboard/touchpad as shown on Figure 2.c) and WSD-VW (flat, width: 7m, height: 2m, total resolution 13152×3872 pixels, composed of 24 HD screens with infrared frames enabling touch, completed by three fixed-height tables with two mobile extended-height chairs at each end of the WSD, a large fixed table opposite the middle of the WSD, touch keyboard displayed in the middle at the bottom of the WSD as shown on Figure 4.c).

Concerning the **task**, the participant first discovered Figma on a computer for two hours. Then, she used Figma to reproduce a UI previously developed for both WSDs as shown on Figure 1. Figma was chosen because of its practicality and popularity. This UI was chosen because it comprises different UI elements (text, sliders, graph, a social media feed). Reproducing an existing UI ensures that it is feasible, well adapted to the WSD environment, and allows observation to be focused on the Figma manipulation rather than the process of creating a new design.

Video cameras and microphones recorded the tests. For the WSD-IA, three video cameras were used, at the top, front (middle of the WSD) and back (at top of the opening). For the WSD-VW, two cameras were used at the back, positioned at the ends of the WSD. Comments and actions **were analyzed thematically** to identify encountered issues.

IV. Results

In general, the participant appreciated the ability to design at a 1:1 scale, regardless of the interaction method and the WSD used, with the main advantage of being able to see the final rendering on the destination screen in real time. Several difficulties can be ascribed to the participant's lack of familiarity with Figma, as the use of widgets, components and plugins was deemed complicated, and the participant was unable to use them successfully.

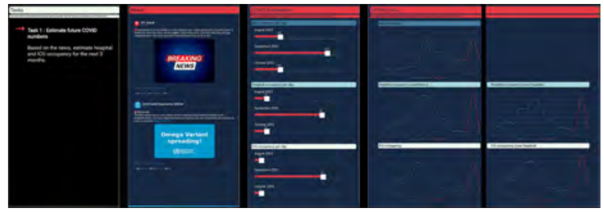

Figure 1. Initial prototype to copy, for more information see [16].

In addition, the configuration of the **Figma environment** was not always adapted for WSDs. For instance, the properties of a selected object are displayed on the right-hand side of the display (see Figure 3.a), the main menu is displayed at the very top (see Figure 3.b) and dialogue boxes open in the middle of the display. The user must also scroll with the cursor or walk through the entire display to modify, e.g., the elements properties (see Figure 2.d), which is tiring over a long period of time. In the following, we will discuss in more detail the issues related to each interaction method.

A. Interacting with a Bluetooth keyboard with a touchpad

The session lasted one hour for the WSD-IA and ten minutes for the WSD-VW. On both WSDs, the participant would sometimes look for the cursor, which was not easy to find on the large display.

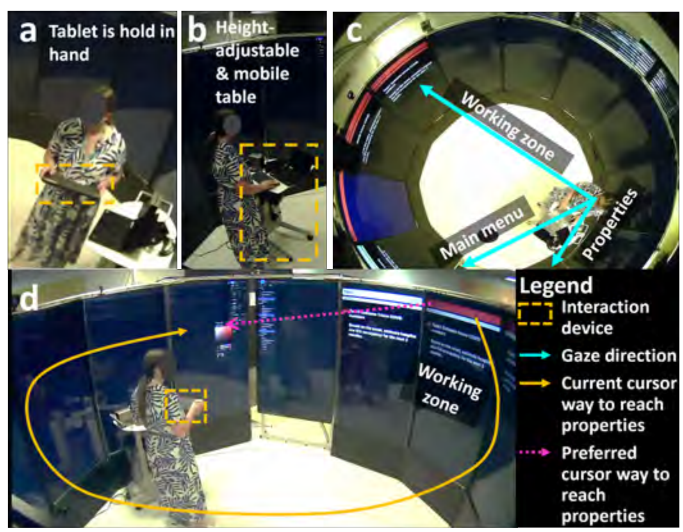

Figure 2. Observations made when interacting with the keyboard+touchpad. a) At the beginning, the participant held the keyboard. b) Use of a table to put down the keyboard. c) Lots of head rotations to see all the important areas. d) WSD-IA does not allow you to cross directly from the left screen to the right screen.

Concerning the *WSD-IA*, the menu and items list were displayed on the screen used as the left door, and the selected

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item's properties on the right door screen. To avoid turning her head from the extreme left to the extreme right too often, the participant closed the doors to look at them both at the same time. She also worked at an angle to see the menu, properties and working area at a glance (see Figure 2.c). As the session was short, and all UI elements were tightly grouped on the left, the position was acceptable. But the position could not be maintained when the user was working in the middle. In this configuration (menu on the left and properties on the right), the participant turned her head and body a lot, which could possibly be painful and exhausting. At first, the participant carried the interaction device, see Figure 2.a. After 15 minutes, she felt physically tired and placed it on a table, see Figure 2.b. Another problem was the impossibility to switch easily from the WSD's leftmost to the rightmost side with the cursor: the participant must move the cursor all the way around the WSD, which is tiring, see Figure 2.d. To avoid turning her head too much, the participant did not follow the cursor with her eyes when it was behind her back.

In the condition of *WSD-VW*, the Figma interface text size was an issue. Due to the size of WSD-VW and flatness, the text could not be read on the opposite side of the display. So, when the user wanted to modify a property's value, she must move to the properties area. The participant walked a lot across the WSD-VW and rested on a table next to it. Then the user leaned on the middle table for comfort and stayed at a certain distance from the WSD-VW to see everything at once. The fatigue caused by moving around, eye strain due to the text size, and carrying the keyboard led the participant to stop the test after ten minutes. Although the WSD-VW and the WSD-IA have nearly the same length, moving the cursor felt less painful here because it was always visible and the experiment duration was shorter.

B. Interacting using direct touch on the WSD

The session with WSD-IA lasted twenty minutes and the session with WSD-VW was stopped after ten minutes.

In the condition *WSD-IA*, to manage physical fatigue (neck strain and gorilla arm), the user tried to work at a lower scale by zooming in on the work area without minimizing the Figma window. Even if the menu remained too high and properties too far away, objects could be moved with smaller movements and were better positioned in the vision field, generating less neck pain. Only the middle eight screens of the WSD-IA support touch, so they were used to display Figma, but its interface elements (list of objects and properties) took up space. So, the designed prototype, which should start on the first touchable screen, was moved to the right, and the UI elements where no more aligned with the tiles, see Figure 3.a. With touch, it was hard to move an object from one tile to another. The Bluetooth keyboard was used to input text or values. It was held in the hand or placed on the table.

On *WSD-VW*, the properties panel was too far away from the work area, but unlike WSD-IA, when a property was changed on WSD-VW, the result was not visible from the user's position. So, she stepped back to check, e.g., whether the

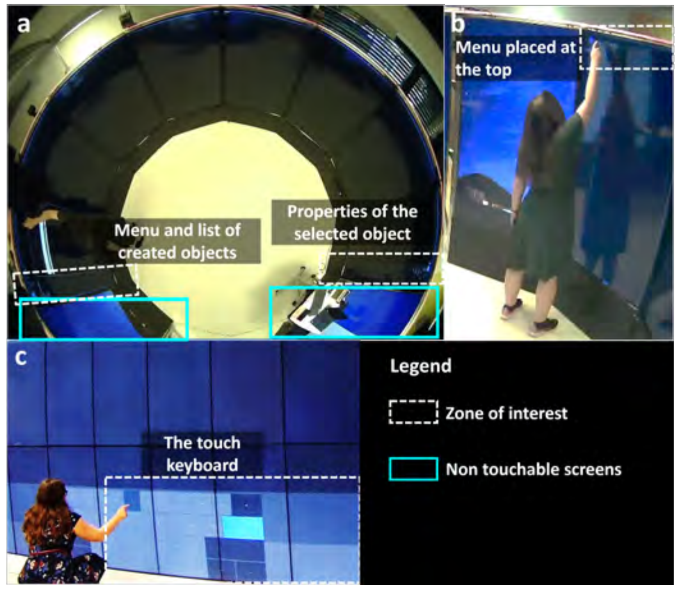

Figure 3. Observations done when interacting with direct touch. a) The touch space is occupied by the Figma interface on the left (list of created objects) and the right (properties). b) The menu is too high. c) The WSD-VW's touch keyboard is not comfortable.

font size is large enough. The top menu was out of reach, and the WSD-VW's virtual keyboard was not suitable for entering more than one word due to its design (position at the bottom and large size, see Figure 3.c). After ten minutes of use, the participant complained from the gorilla arm.

C. Interacting on a synchronized tablet

The same Figma project was loaded onto the tablet and onto the WSD. The UI elements were created, moved and adjusted on the tablet. We observed that the participant mainly looked at the tablet to add UI elements, move them around and set parameters, see Figure 4.a. Then, the participant looked at the WSD to check, e.g., the position and size of the UI elements, the readability of text, and colors, see Figure 4.b. A main issue was the impossibility to select several UI elements at the same time on the tablet, as they are superimposed. The session with the WSD-IA lasted ninety minutes, whereas the session with the WSD-VW was stopped after twenty minutes.

On *WSD-IA*, the user had difficulties to position the UI prototype on the WSD correctly, as the position on the WSD was not synchronized with the tablet, although the modification of UI elements was kept in sync. This required the use of the extra Bluetooth keyboard's touchpad. The participant also used the touchpad to select a group of UI elements to save them as a new reusable UI element. She placed the tablet on the height-adjustable and mobile table. She felt that the WSD-IA and tablet configuration was the most comfortable.

On *WSD-VW*, the participant sat down and placed the tablet on the table, see Figure 4.c. But, as the table was not well positioned and too heavy to be moved, she preferred to hold the tablet in her hand, which was tiresome.

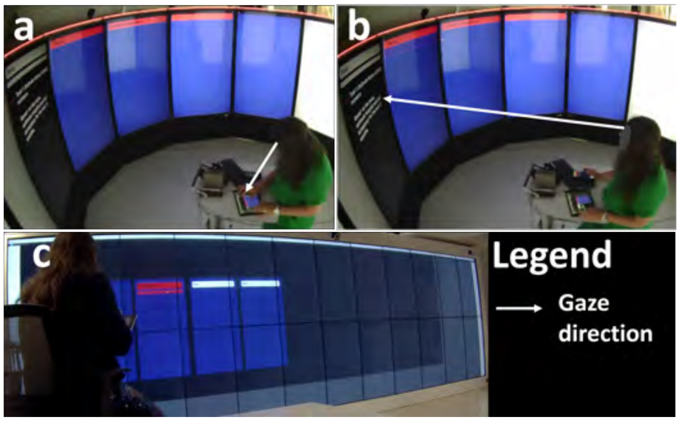

Figure 4. Observations done when interacting with a synchronized tablet. a) The participant modified the prototype on the tablet. b) Then, the participant checked the result on the WSD. c) The participant sat on a chair.

V. Discussion

The duration of the test sessions varied widely, from ten to ninety minutes. The most comfortable condition seems to be the WSD-IA with a tablet and a height-adjustable and mobile table. But the problem of multiple selection and correct positioning of the prototype on the WSD needs to be solved. Overall, the main issues were: (I1) physical fatigue, (I2) accessibility of Figma elements, (I3) readability of the Figma interface, (I4) the hugeness of the interaction surface, (I5) when a project is reopened, objects are moved to the middle, (I6) that a part of the WSD is covered by the Figma elements, which is not a perfect 1:1 scale, and (I7) that dialogue boxes open in the middle of the display.

(I2), (I3), (I5), (I6) and (I7) show that Figma seems not adapted to prototype at 1:1 scale on WSD. We propose some design ideas for each issue. (I1) could be reduced by managing the physical environment and providing a height-adjustable and movable table to place the interacting devices or by interacting at a distance. (I2) could be improved by offering floating contextualized menus and value input fields, by opening dialogue boxes close to the work area or by using a smaller interaction device as a tablet or a laptop. For (I3) and (I4) the size of the Figma elements should be adapted. For (I4) a bigger cursor should be used as well as accelerated scrolling to reach the opposite end of the WSD. (I5) could be solved by fixing the UI elements in their positions and reloading them in exactly the same position. To achieve 1:1 scale (I6) the Figma interface should be concealable or movable. (I7) open the dialogue boxes near of the working zone.

Our findings come with the following limits. The task was limited to the reproduction of an existing UI prototype for a WSD environment. The study involved a single participant who had never used Figma. The advantage was that the user had no prior habits, e.g., using specific shortcuts and was not frustrated by not being able to work as quickly as an expert would on a familiar software.

VI. Conclusion

We presented a preliminary study on the use of Figma to design at scale 1:1 on two different WSDs using three different interaction methods: touch, a keyboard and touchpad, and a tablet. The main study results are that (i) prototyping at 1:1 scale and being able to see the final rendering in real time is appreciated, (ii) interaction with a tablet seems to be the most comfortable, (iii) the design of the physical environment is of utmost importance, and (iv) Figma seems not adapted to this usage in its current form.

In the future, we will expand our sample with a random order of our conditions, to verify our initial observations, and we will explore other prototyping tools.

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