FizzyVis: Designing for Playful Information Browsing on a Multitouch Public Display

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ABSTRACT
Multitouch screens are being increasingly deployed in public settings. In order to provide useful information to users in an attractive way, playfulness of the interaction is a relevant characteristic. In this paper, our contribution is FizzyVis, a walk-up-and-use interface that displays information through bubbles reacting to touches, and its design goals. The interface following a "ball pool" metaphor presents three types of bubbles animated and linked to each other by gravitation and magnetism: content bubbles, browsing bubbles and map bubbles. FizzyVis supports playful use through catching curiosity, projecting users in a playful state of mind, enabling easy and explorative information browsing, enticing playful gesturing and collective play, and rewarding finish. FizzyVis is evaluated regarding these design goals in a field study at a music festival over several days. The UI was useful to find information and playful. We detail the use of the installation to uncover generic lessons to be learned and explore further potential of FizzyVis.

Categories and Subject Descriptors
H.5.2: User interfaces, User-centered design.

General Terms
Design, Experimentation, Human Factors.

Keywords
Multitouch UI, Playfulness, Walk-up-and-use, Field trial.

1. INTRODUCTION
Public interactive installations are used by heterogeneous passers-by, who seldom approach with a particular task in mind. Therefore, a system needs to tempt people into approaching and interacting.

Earlier research suggests that these systems should be playful, pleasurable, enjoyable, fun, hedonic, recreational, amusing, etc., in order to lower the threshold of entry, as well as to engage people in longer-term use. These attributes, however, are insufficient for explicating what makes the participants consider the interface to be playful.

We focus on public multitouch displays and on how to design interfaces that nurture playfulness. In particular, our research considered a public space at a jazz festival, where we installed a large multitouch display providing event-related media. An event such as a jazz festival provides a challenging context for design, since it has several locations, lasts several days and includes diverse categories of content (artists, services and sponsors). This complex information usually accessible in leaflets and websites needs to be available in an easy and engaging way.

The opportunity provided by large multitouch displays is to allow several persons simultaneously at the display and foster social interaction. The interface described here can provide a playful experience together with serendipitous access and navigation of useful information.

What we mean by playfulness is an activity that while not being proper play has some characteristic of it [20]. We are most inclined in taking into consideration (1) Imagination and fictional space, (2) Physical and bodily spontaneity, (3) Social spontaneity and (4) Discovery to browse information as serendipitous exploration.

In this paper we propose a design of a multitouch interface for large walk-up-and-use displays to show what features of the design can be used to address the points listed above, thereby contributing also to a better understanding of what playfulness is, why it is beneficial and how to design for it. The installation at a jazz festival is used to evaluate the design.

2. RELATED WORK
Multitouch interaction naturally provide a platform for playful information manipulation. Surface computing brought about particular types of playfulness in performative actions, bodily and physical play, and social interaction [12][11][17].

Playfulness has been considered in computer use in office work settings with the spreading of personal computers and direct-manipulation interfaces [20]. The general background for understanding playful elements in this context includes the theories of Flow [5] and other studies of child's play [1] that operationally define it in terms of five constituent dimensions: physical spontaneity, social spontaneity, cognitive spontaneity, manifest joy, and sense of humor. Cognitive spontaneity for [15], for example, is the imaginative quality and the degree of capability to assume different character roles, invent unique games, or use objects unconventionally. While researchers have

Designing Pleasurable Products and Interfaces, June 22–25, 2011, Milan, Italy.

observed inherent playful aspects of computers, the rise of computer games and entertainment computing have introduced frameworks for analyzing the principles and components of games [3]. Prior to computer age, Roger Caillois [4] identified competition, chance, role-play simulation, and vertigo to be considered along axes of more rule-oriented or free play. Such components have been adapted for detailing principles of game design (e.g., [18]), providing additional background useful for understanding playfulness also outside structured games.

Research has documented a variety of interactions based on physics to simulate aspects of the real world on tabletops that provide playful interactions [21]. However, playfulness does not have its origins in merely simulating physics; rather, it may have also “magic,” unrealistic aspects. Some of the latest surface applications, such as [14], include physics and other playful features and for the authors invite reflection on how to design systems to allow switching “from a playful mode to a work mode”; while playful features introduce “chaos,” they also provide creative engagement with archived content.

In our analysis, we focus in particular on designs for public walk-up-and-use multitouch displays, to gain understanding of how these approaches have succeeded in providing playfulness for the user’s real-world use of the system in the public or semi-public spaces. While documented surface computing interfaces for public spaces are *ad hoc* implementations and not aimed at providing a general interface for information browsing, they do address specific aspects of urban or museum settings.

Even a commonplace multitouch application such as picture browsing can turn into a playful stage. In *CityWall* [17] a multitouch timeline of pictures supports playfulness in social spontaneity by inciting games (pong, soccer, etc.) and non-sense activities (waving hands, etc.) to help users entertain themselves and others on site. The *Worlds of Information* as a redesign of *CityWall* [11] are 3D widgets that provide parallel access and browsing of media displayed on spheres. Widgets for parallel interaction predisposed users to a different type of *social spontaneity* as conflicts were not a relevant observation. This work points also to the need of supporting diversity of the content and gradual discovery of content and functionality.

Playful browsing has been addressed with surfaces in a museum context. *EMDialog* [6] is a two screens set up that allows accessing a set of texts structured in a tree. The study proposes that engagement can be achieved through exploration and a trial-and-error approach rather than giving of instructions. *Memory [en]code* [19] allows users to enter memories and interact with them via a tabletop interface. Memories take a cellular form with their own autonomous behavior and lifetime. *Tree of Life* [7] is a touch tabletop in a museum installation providing information browsing through interaction with information bubbles. Question bubbles appear and by touching a question bubble other bubbles with text and pictures appear with answers. The study shows, like several of the ones above, how visitors engaged in the interaction may be more interested in the interface than in the information.

In general, deployment of multitouch in public is rare and not well documented. However, initial designs and studies of public and museum projects indicate that playfulness can be a beneficial quality to harness. In particular, to design for a playful interface in public, approaches have included multiplicity of widgets, to allow parallel access and therefore social interaction (learning and the honeypot effect [2]); and animation and behavior of widgets through for example physics for creative engagement and discovery. Given the current ad-hoc design solutions, more generally applicable designs would be beneficial that directly address walk-up-and-use multitouch for playful information browsing.

3. FIZZYVIS: A PLAYFUL MULTITOUCH UI FOR WALK-UP-AND-USE BROWSING

3.1 Design Goals

Creating a playful public display experience was the primary starting point for the FizzyVis design with stakeholders. In the introduction, we presented four considerations that guide our view on playfulness (imagination, physical and social spontaneity, and discovery). These are used as a basis for the design goals, which we now consider. In order to create a playful public experience, we aimed at (1) catching attention, (2) projecting users into a playful state of mind, (3) enabling walk-up-and-use easy information access, (4) fostering explorative information browsing, (5) attracting to playful gesturing and collective play, and (6) a rewarding finish. These design goals are related to phases and purposes of use. Horizontally in Figure 1, design goals are linked to five typical phases of use [12]: initial noticing, approach, initial usage, advanced usage, and exit. Vertically, design goals are shown as related to two purposes of use: information delivery and play. However, the goals shown in the middle form a continuous complementary loop, and contribute in practice to both information delivery and playfulness. We have kept the division visible in Figure 1 to show the core emphasis of each principle.

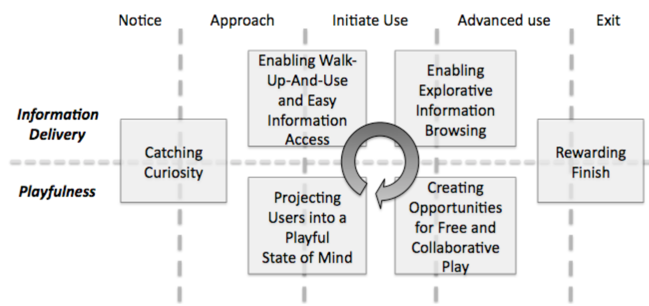

Figure 1: FizzyVis design goals structured according to the phases and purposes of use.

In the next six paragraphs we present the FizzyVis design goals and why we chose them.

We first aim at activating curiosity. Appealing to curiosity is of paramount importance for a public display [17][9]. Curiosity can stem from imagination, social spontaneity (honeypot effect [2]) and an urge for discovery. In the case of a multitouch display, it is not enough to catch attention: the display needs to attract users, prompting an approach and finally starting to touch the display.

We aim at enabling walk-up-and-use easy information access. Walk-up-and-use means that users do not need to pay attention to any instructions or, in general, need guidance before starting to use the system [6]. Some users have a specific information need in mind and want to have direct access to this piece of information. For this reason, all information must be easily accessible.

We aim at projecting users into a playful state of mind. As pointed out in the introduction to this paper and by [15][16], creating playful user experiences requires imagination and spontaneity from the user side. Even if this is user-dependent, a system can aim at creating opportunity for imagination.

We aim at enabling explorative information browsing. Serendipitous exploration is a key contributor to play through pleasurable and rewarding surprises [4]. This is related directly to the discovery dimension discussed above. In addition, for the festival organization and corporate sponsors, it is important that users can find even more information than what they came to look for initially, because this way users might end up participating in more events or be exposed to the messages of the sponsor.

We aim at creating opportunities for playful gesturing and collective play. As pointed in the introductory section, creating playful user experiences requires playful gesturing and collective play. These physical and social fundaments of play are addressed in most related theory, e.g. [4][1].

We aim at a rewarding finish. The final goal, involving the final outcome, is related to physical and social spontaneity, for the end of the interaction often comes about through physical manifestation aimed at signaling to others an intention to leave. Also, the final moments of the user experience have the greatest impact on the memories that users generate while using the system [13].

3.2 Addressing Our Goals: FizzyVis Elements

The original design of Fizzyvis is based on the ball pool metaphor. One possible implementation is shown in Figure 7. The FizzyVis hardware interface is multi-user and multi-touch. Passers-by can enter and leave spontaneously, and start playing in parallel, together or concurrently. This allows playful collective gesturing, collective exploration of information, and collective learning for walk-up-and-use interaction. We now present other FizzyVis elements.

3.2.1 Basic Bubble: Elementary Information and Gravitation

Basic bubbles (shown at the top of Figure 2) obey a simulation of gravitation on the screen. The gravity is aimed at “fizzy” movement and therefore at stimulating the curiosity of passers-by. However, the gravitation is disabled when a bubble is touched. If several types of basic bubbles are needed, they can be labeled through the color of their contour. A colorful display also contributes to catching attention.

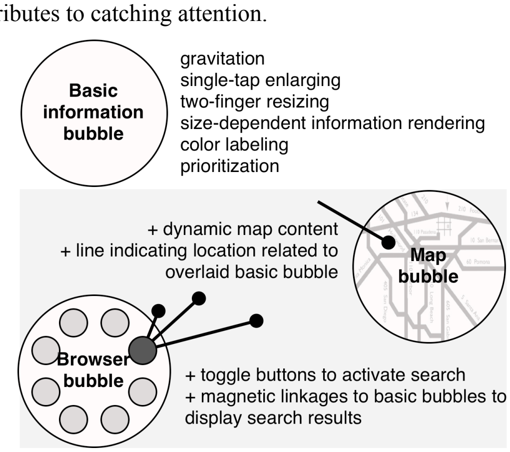

Figure 2: Basic elements of FizzyVis - the bubbles.

Bubbles can be enlarged with a single tap. They can be resized until constrained minimum and maximum sizes are reached, with a two-finger gesture now common in multitouch interfaces. In order to enable walk-up-and-use easy information access, we do not use multitouch gestures that need to be learned. Collective or individual playful gesturing can be achieved through touching, dragging, and resizing. For example, bubbles can be used as building blocks for wall-like structures. After being released, FizzyVis’ bubbles don't stop because of gravity, so users can throw them to bounce around. This is an opportunity for single user play but also an incentive for an exchange with other users.

On resizing, the information’s detail of a bubble is automatically rendered according to its size. The size-dependent rendering of the information promotes explorative information browsing. The bubbles shrink and fall down automatically after users have stopped touching them for a few seconds. Therefore users don’t have to expend extra effort to complete the session and instead can leave the system at any desirable point and have a rewarding finish to the interaction.

3.2.2 Balancing accessibility of basic bubbles and cluttering

Ideally, all basic information bubbles are visible on the screen in order to enable easy information access. Then, priority can be given to particular bubbles. The initial appearance, the size, and the weight (a dynamic feature) of the bubbles can be configured via a content management system. Depending on automatic or manual prioritization, bubbles appear in different sizes. Bigger ones are more likely to be seen and interacted with. This promotes explorative information browsing. They can also be hidden in order to avoid cluttering. Prioritization is useful when a single FizzyVis implementation includes as many as thousands of basic bubbles for a limited screen size.

Basic bubbles, prioritized or not, allow displaying basic information with text and/or images. FizzyVis also has two more types of special bubble: map and browser.

3.2.3 Map and browser bubbles

In addition to the basic bubbles features presented above, the map bubble (seen at the center of Figure 2) has dynamic content: the map shows a blinking “you are here” indication. Also, when a basic bubble comes in contact with the map, its contour turns white and an arrow points to the location on the map, to allow easy information access.

The second type of specific bubble is the browser bubble (at the bottom in Figure 2). To enable easy information access, toggle buttons can be pressed to activate search for a particular item that is hidden or not easily found among the many bubbles on the screen. In order to display the results of the search, basic bubbles corresponding to the request are magnetically attracted to the browser bubble and lines are drawn between the resulting bubbles and the browser.

3.2.4 Bubble-to-bubble interaction: Collision and magnetic linking

Bubbles interact with each other through collision detection (Figure 3, top). Two bubbles cannot overlap; this avoids occlusion of information and enables bouncing against each other. This, as a physical feature similar to gravitation, is aimed at having fizzy movement and therefore attracting the attention of passers-by.

The ball pool metaphor in general, including collision detection, is used for projecting users into a playful state of mind. Users can associate the interface with an idea of simple play; toss bubbles around and swim through them, as a fundamental form of play.

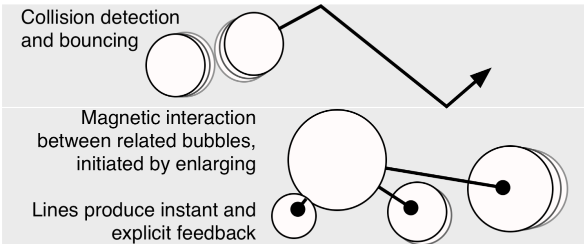

Figure 3: Bubble-to-bubble interaction.

Bubbles interact with each other also through magnetic links (Figure 3, bottom). Enlarging a bubble triggers the magnetic attraction of bubbles containing related information. In addition to the instantaneous feedback of the attraction, lines are drawn to explicitly show which bubbles are attracted (Figure 3, bottom). This also is done to enable walk-up-and-use interaction with immediate and explicit feedback. Other examples of immediate and explicit reaction to users' actions can be found in our design, e.g. when one touches any location on the screen, small white shadows under the fingertips indicate that touches were recognized. Magnetic linkages promote explorative information browsing. They are activated as soon as the bubble is opened, and often while just reading the information nevertheless without disturbing.

Magnetic linkage also fosters playful gesturing of dragging several bubbles behind a single one, making "sun" or "flower" shapes appear on the screen, or "messing up" the whole screen by reorganizing the location of a significant number of bubbles at once. Also, resulting movements of the bubbles create surprising combination and activate users' desire to explore.

3.3 Example: FizzyVis Elements Applied to a Jazz Festival

Our case study was one of the biggest jazz festivals in Europe. We implemented FizzyVis for the Jazz Festival information on a 2.8m×1.1m rear-projected, multitouch, vertical screen (see Figure 7). The official information covers 102 concerts, 10 venues, 134 artists, and five products from one sponsor.

The implementation of FizzyVis for the Jazz Festival used four types of basic bubbles: concerts, venues, artists and sponsors, which have purple, flesh-colored, fuchsia, and no contours respectively (Figure 4, left). Also we had a map, and two browser bubbles: The program browser ("Ohjelma" in Figure 4 and Figure 5) in plain purple, the color of the concerts contour, and the artists browser in plain fuchsia, the color of the artists contour (see Figure 4). In the Jazz implementation, sponsors' bubbles have a lighter weight than the others. As a consequence, they bounce more easily, in order to entice users to play more with them.

Figure 4: Types of bubbles in the Jazz implementation of FizzyVis: venue, artists browser, concert, map, artist, program browser, and sponsor (left) and resizing of the artists' browser bubbles (right).

In Figure 5, the program browser bubble has a toggle button activated, corresponding to July 19th. The eight concert bubbles related to this day magnetically gather around the program browser.

In Figure 6, the concert bubble on the left has been expanded and as a consequence display the attraction mechanism. Instead of displaying only its title like in Figure 4, the enlarged bubble displays the full program of the concert and eventually attracts (1) the two artists performing at this concert and (2) the venue where it is to take place. In Figure 4 (right), the artists' browser bubble is enlarged: it first shows letters grouped by intervals (Figure 4, left) and then gives every single letter instead in an array when space allows (Figure 4, right). Figure 6 also shows interactions between a map and a concert. The contact between the concert bubble and the map triggers the white contour and white arrow feedback.

4. FIELD TRIAL

4.1 Data Collection and Analysis

During the nine days of the festival, installation usage was recorded with two video cameras, one pointing toward the screen and the other recording what happened in front of the tent, to observe how people approached the display. The first camera was connected to a microphone that was rigged just above the screen, to capture talk at the display. The videos were complemented with ethnographic field notes, and selected episodes were transcribed and analyzed in more detail. The research setting was naturalistic, in the sense that avoided interfering with the participants.

We also distributed a questionnaire (N = 130) about the interface. Questionnaires were collected directly after use in close proximity to the display. A small majority of the respondents were men (54% and 46% women). The age distribution of the data was slightly skewed towards young people (44% 13-24, 31% 25-39, 22% 40-59, 3% 60-74). Most of the respondents were frequent ICT users, 88 % stating that they use ICT on daily basis.

4.2 Results

In the analysis, our focus was on observable behavior at the interface, and questionnaires were used more as to frame and inform the interaction analysis that follows. Results below address each design goals (see above) respectively.

4.2.1 Piquing curiosity

Questionnaire data showed that the system's appearance was the primary motivation for users in starting to use it. About 40% of respondents came to the screen only because they noticed it on the street, and 20% noticed first the poster near the system. The rest

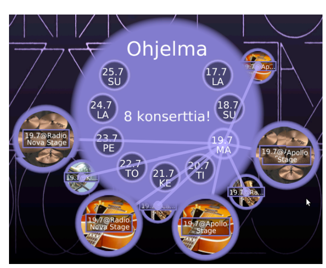

Figure 5: The Monday, July 19, toggle button is pressed on the program browser bubble and attracts concerts taking place on that day.

Figure 6: Contact between a concert and a map triggers the display of an arrow pointing at the concert location.

of the users came because they saw or heard an advertisement or a story or because of various word-of-mouth channels. Furthermore, when we asked why people started using the system, 58% replied that they were curious about it; 35% wanted to play with it; 34% were interested in the technology; and only 20% started using it because they were looking for some specific information.

As discussed in [17], movement on the screen is likely to better activate the curiosity of passers-by. However, the presence of other people at the display is perceived evidence of interestingness of some kind and creates the strongest honeypot effect.

Figure 7: Pointing: "should we now click there?"

```
01 F2: what's this?
02     (3.0)
03 F1: (      )
04     (6.0)
05 F2: should we now click [there?
06                         [{pointing}
07 F2: [what is it(    )
08 F1: [{approaches the display}
09 F1: {hovers index finger above artist search}
10     {clicks "A-C"}
11 S:  {bubbles collect around search bubble}
12 F1: {steps back, standing side by side with
13     F2}
14 F1: well ↑that's exciting
15     (4.0)
16 F1: what do you think- no clue what it does
       (3.0)
```

Example 1: Considerate approach to the display[1]

When approaching an interactive installation, users faced environmental obstacles or other distractions that hinder or restructure their progress towards it. The tent was built on a wooden platform about 20 cm high. This seemingly insignificant detail, one step up to enter the tent, was the most noticeable obstacle. People often stopped in front of the step, to look inside before entering the tent. For some, it was enough just to observe from this distance.

After sunset, we opened the side of the tent and moved a poster stand with brief instructions next to the tent entrance. The instructions ended up being both invitation and obstacle. The poster stand was approached from a distance, and people often stopped in front of it to read the instructions before entering the tent. Again, however, there were also people for whom this information was enough and who never stepped in to use the system.

4.2.2 Enabling walk-up-and-use and easy information access

In the questionnaire, we asked users to rate claims on a Likert scale (1 = agree, 5 = disagree). For the claim "System was easy to use" (average = 2.28, mode = 2, median = 2, standard deviation = 1.51), the results were clearly positive. For the claims "I would recommend it to my friends" (2.39, 1, 2, 1.31), "I will use it again " (2.51, 1, 2, 1.29), and "I could use the system regularly" (2.60, 2, 2, 1.22), the responses are also positive. And for the counterclaim "Using the system was hard" (3.79, 5, 4, 1.27), used as a check, responses were clearly negative. The claims regarding system usefulness scored clearly positive; "The system is useful" (2.17, 1, 2, 1.25) and "The content in the system is useful" (2.13, 1, 2, 1.23). The check item for usefulness had a slightly negative score: "Finding information was hard" (3.39, 4, 3, 1.28).

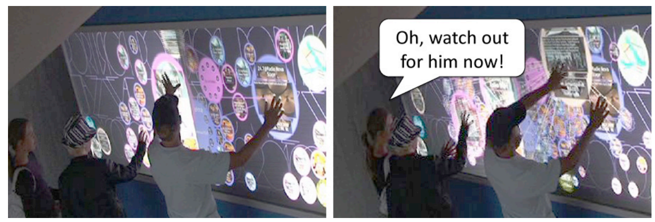

Figure 8: A man controlling the center when two girls arrive

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01 F1: like what is this then?
02 F2: is [is like this sorta- thing
03 F1:    [{takes hold of artist-bubble}
04 M1: {activates a venue bubble, multiple
05     artist bubbles are pulled towards center}
06 F1: {scales up artist bubble}
07 F2: oh watch out (.) for him now
08 M1: {looks left towards girls}
09 F1: [{hovers index finger above text}
10 F1: [this (.) I dunno-
11 F2: ↑how? this is fu:n? (.) look?
12 F2: {tries to move venue bubbles but fails}
13 F2: how can these be- what can I do with this
14 F2: {slowly moves one venue bubble up}
15     {steps back}
16 F2: £this isn't working out
17 M1: {EXIT}
18 F2: @Veeti Kallio@ ((artist name))
19     (10.0) ((F1 & F2 silently browse and move
20     the content bubbles))
21 F2: how can you like- (.) I'm LOOSING MY MInd
22 F2: [{trying to push bubbles to the right}
23     [@wauuh (.) @aaah (.) ((laughter))
24 F1: {walks right, next to day-search bubble}
25 F1: here is Sunday and tomorrow's program
26 F2: Kirjurinluoto Jeff Beck ((reading aloud))
```

Example 2: Two girls arriving at the display

People had different strategies for approaching the display. Some rushed directly to touch the screen, while others first stopped in front of it to ponder how the UI works or what was being displayed at the moment, etc. Some initiated immediately a game of mindless play and laughter, while others started with a careful, stepwise exploration. In Example 1, two women have just arrived at the screen and stand in front of it for 20 seconds before the first

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[1] Mn / Fn = male / female participant, S = system behavior. See transcription conventions in [10].

touch (Line 10). Instead of stepping forward to touch the screen herself, F2, by way of asking a question (Lines 05-06), mandates F1 to act on their behalf.

The first bubble to be touched can be selected only from among those that happen to be on the display and are not being used by anyone else. In Example 2, M1 is standing at the center of the display, and as F1 and F2 arrive, they take over the remaining space on the left (Figure 8). As M1 is controlling the search bubbles, F1 and F2 will have to start from the haphazardly sifted artist bubbles in front of them. M1 activates a venue bubble (Line 04), pulling most of the bubbles around the one held by F1, towards the center of the screen. F2 notes the potential conflict between M1 and F1 (Line 07), but this is ignored by F1, who continues to scale-up and read the content of the bubble (Lines 10-11).

The approach strategy (e.g., *pondering* vs *rush forward*), but also the first experience, the first touches and the first bubbles opened, may establish the tone or orientation of the interactions that follow.

In Example 1, the two women had the whole screen to themselves, being able to choose from among all the visible objects. In contrast, choice was more limited in Example 2, since it would have been difficult to approach and interact with objects that M1 was already using. In both examples, the users ended up solving learnability problems but from an angle delineated by their initial approached strategy and the first bubbles selected. In Example 1, the two women started from a dominant element, the artist search bubble, but instead of searching for a particular artist, they approached it carefully and in a linear fashion, alphabetically, by selecting the “A-C” button. Subsequently, instead of diving in to see the content of the collected set of bubbles, they take a time-out (concretely, one step back) to analyze the most recent response from the system (Lines 12-17).

In Example 2, the two girls are forced to start with the content bubbles that provide simpler means for interaction, and more straightforward feedback. As these bubbles are touched, they reveal more content, which then helps in learning what the search bubbles are meant for (*finding content*). Once they have learned about the content bubbles first (Lines 01-23), they later find it easier to move on to explore the search bubble that manipulates them (Line 25 onwards).

In theory, one can approach the installation from a purely UI point of view, ignoring content, touching and interacting with the bubbles to see how they function. However, this strategy is problematic, because one cannot construct an idea of the interface without understanding the relations of the content it manipulates. Nevertheless most people seemed to walk-up-and-use the interface, not walk-up-and-use the content. In its idle state, the system actually did not reveal much detail. Thus, it is not surprising that the first works spoken at the installation most often addressed the UI design and implementation not content. For instance: “whow crazy”, “How does it work”, “can I touch it”, “I’ll have to give it a try”, etc.

4.2.3 Projecting users into a playful state of mind

It is difficult to say exactly from the video analysis how much the overall design or metaphor of the ball pool affected how the users perceived the system. However, the questionnaire results clearly show that the system was geared more towards fun/play than instrumental or utilitarian uses. From the questionnaire data, we can say that users perceived the system clearly as playful. Claims related to playfulness scored high: “Using the system is like play” (1.97,1,2,1.28), “The system is fun” (1.96,1,1,1.34), and “I would like to play some game with the system” (2.56, 1, 3, 1.46). Also, the counterclaim “The system is not fun” received low scores (4.01, 5, 5, 1.37). As reported earlier, 35% of respondents said that they started using the system because it was “playful.”

Figure 9: "Wanna see?” Bouncing hand-over of a bubble.

```
F1: you can like pull these here like this
F1  look [{moves bubbles back and forth}
F1:      [@jeeehh
F2: heheh [{moves bubbles back and forth}
F1        [heheh .hh eh .hh heheh
F1: [.hh @jeeehh
F1: [{moves bubbles back and forth}
F2: [{moves bubbles back and forth}
F1: {moves bubble, handing it over to F2}
F1: @wanna ↑see? [.hh hehheh .hh
F2:               [heheh
F2: [{moves bubble, returning it to F1}
F2: @here? ((or “here you are”))
F1: ehehe .hh hehheh
F1: [{bouncingly hands over bubble to F2}
    [@wanna ↑see? (.) here?
F2: wellh [heh
F1:       [heh
F1: oh here’s a funny one
F1: tsheh [heheh
F2:       [heheh
F1: look look Apollo ((concert place name))
F2: have you been with Katariina (---)
    ((20 s talk about summer camp, both girls
    moving hands constantly on the display))
F1: {scales up program bubble}
F1: look this enlarges
```

Example 3: Nonsense play with the bubbles.

Fun and play dominate users’ expectations and post-hoc perception of the system. But how does the system concretely support play? The next example illustrates how certain UI elements were used by maintain fun and play.

In Example 3, two girls arrive at the installation. Instead of showing interest in the content, they focus on the interaction possibilities of the bubbles. The first 15 seconds (Lines 02-08), consist of repetitive moving of the bubbles and unrestrained giggling. In this case, fun was supported by the ability to interact with the bubbles directly. On top of nonsense, repetitive hand movements, one can then invite laughter, giggling and joking. However, these movements can also support thinking and production of any type of talk (Lines 24-25). The ability to actually view the content was recognized later (Line 09-10), but the girls used it only as material for caricaturing serious usage. The girls are handing over bubbles to each other, and back, *for reading* (Lines 09-16), but overdo their act in ways that only strengthen the original, non-serious tone.

To be able to laugh together at something, one needs first to identify or construct this object. In this case, the installation was the object being constructed and ridiculed. Firstly, the girls use animated tone of speech (Lines 10, 13, 16), as to externalize themselves from the movements they perform with the bubbles. The use of bubble or ball pool metaphor was methodic. The bubbles, as they were moved, were presented as autonomous objects that navigate the pool of other bubbles, or bounce like rubber balls to the other participant (Lines 15-16, Figure 9).

4.2.4 Enabling explorative information browsing

From the questionnaire data, it is not that clear that the system elicited explorative behavior. The claim "I found new information in surprising ways" was given a slightly positive score (2.70, 3, 3, 1.21). However "Content in the system is useful" (2.13,1,2,1.29) received clearly positive score and the system logs clearly show that the artists and concert bubbles are most popular, and among concert bubbles users clearly used those related to the current day and the next day more often. This is partly supported by the questionnaire data as the respondents found Looking up an artist (47% of the respondents), Looking up a concert (32%), Looking up for a venue (32%) and the Map (31%) to be the most useful content for them.

4.2.5 Creating opportunities for playful gesturing and collective play

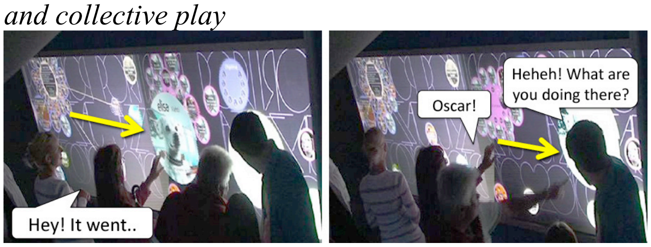

Figure 10: A sponsor bubble bounces from the left.

```
01 S:  {elisa vahti bubble overlays artist bubble
02     in front of F4}
03 F4: hey:: (.) it went-
04     {pushes lightly the bubble to right}
05 S:  {the bubble continues to fly on top of map}
06 M3: [@O:scar?
07 M3: [{steps forward, pointing at the bubble}
08 M2: heheh @what are you doing there?
09 M2: now it- Liisa [messed up the thing]
10 F4:              [why its going crazy] ahah.
11 F4: £wonderful Oscar
```

Example 4: Turning the problem into an esoteric joke.

Most questionnaire respondents (70.6%) used the system with a friend or family member. Example 3 illustrates that gestural play between friends was well supported by the system. Besides the fact that people are joking, playing etc., because it is entertaining and fun, we can ask what other purposes they serve in interaction, especially when it comes to interaction between strangers.

In Example 4, the woman on the left side accidentally bounces a sponsor bubble towards the center of the display, where it overlaps with the bubble F4 is reading. This is recognized not only by F4 herself (complaint on Line 03), but also her company, M2 and M4. They however do not problematize the other party on the left side of the screen. The sponsor bubble contains a picture of a puppy, and M3, builds on this visual element, suggesting it resembles a person (or an animal) named Oscar whom they know (Line 06). M2 picks up and extends the esoteric joke: "what are you doing there"?

Similar to this example, there are many instances in the data where joking, laughter, exaggerate gestures etc., are used to solve a problem that has just emerged. When strangers' doings are in conflict with each other, the situation can be turned into a joke so that nobody loses face, and similarly, if the system is not behaving as expected. Thus, supporting playfulness lowers the threshold to participate and use the system.

4.2.6 A Rewarding Finish

36.6% of users indicated that they stopped using the interface after they found the information they were looking for, while 21.4% "wanted to allow space for the next users." A minority of users (8%) found "usage too hard to continue," "didn't find the information [they were] looking for" (4.5%), "didn't see use in continuing," (8.9%), or "got bored" (11.9%). Among "other reasons" (18.8), half were related to system malfunction and the rest were positive reasons such as "found enough information," "started filling in the questionnaire," or "friend was waiting for me." If we sum the positive reasons, we find that 62% reported the end condition as clearly positive. For others, the end condition was not necessarily negative. This leaves more room for speculation.

In the video data there are many concluding actions, similar to [17]. For example, people were throwing the bubbles around, or cleaning the screen in front of them, scaling bubbles to their maximum size etc. This can be seen as ways to summarize the usage experience, or leave your personal fingerprint [17]. When attending the display with friends, conclusive exits can be used to supplement or replace words to suggest that it is time to leave.

5. CONCLUSION

This paper makes a contribution with FizzyVis, a playful multitouch walk-up-and-use interface for information browsing. We have addressed some basic requirements of information browsing at, for example, a public event such as a festival. We have also presented goals that guided the design (summarized in Figure 1).

The field evaluation of an implementation of FizzyVis for the Jazz Festival further allowed us to gauge the success of our design. Results from a questionnaire showed that users found the interface useful for finding information, as well as playful. Analysis of episodes of interaction from the video data described qualitatively how play occurred with FizzyVis in this context.

However, our study shows how elusive the concept of playfulness can be and the need to find operative aspects of it if we are to address them concretely. Even if our goals reported in the introduction have their roots in the literature, they partially reflect a concept of play that does not yet have an agreed definition ready to use in design. Moreover, we show that playfulness is not easy to identify, not to speak of measuring it. Field trials in naturalistic settings are needed to discover new points of view to the idea of playfulness, and to challenge our preconceptions about it.

The evaluation showed that the strategies users adopt in their interaction with FizzyVis are more complicated than expected. The play happening at the interface depends on the UI but also on other parameters, such as the mindset with which users approach the installation or the interaction with other users. The design of such an interface can only provide *opportunities* for play. In particular, even though FizzyVis makes an initial contribution toward our design goals, we found in the evaluation that these can be further explored. For instance, the completion of the interaction was intended to be rewarding, but the evaluation showed that users were applying strategies that we didn't take into account in their finishing of the interaction. For instance, the wisdom of automatic closing of bubbles is questionable since users tend to make concluding gestures to signal to others the will to leave. In addition to the interface design, many other aspects, like geographic features and human-built constructs on site, affected on how well the installation caught the curiosity of the passers-by.

Another limitation is related to the support for the intertwined serious and playful activity that users show with FizzyVis. Even if our interface were able to support both, qualitative analysis showed that playfulness can get in the way of finding information. To some extent, we can argue that most people had a strategy of state of mind (e.g. fun vs serious), already before entering the tent. However, they cannot always follow their own mind, because of their need to align their action to inferences of their friends or third parties.

FizzyVis could be improved by going even further towards our design goals. Apart form the limitations we already pointed out, we noticed for instance that walk-up-and-use interaction could be improved by having even more explicit feedback for magnetic attraction with, *e.g.* coloring of attracted bubbles like we did for the map coloring the bubbles in contact. The procedure to open the bubbles could also be improved for by taking into account the double-tap, if possible, since a large number of users tried it. To foster exploration, the prioritization of bubbles could also be taken further in order to adapt the amount of each type of bubbles to the number of users interacting or to their touching activity and history.

The design choices succeeded to satisfy our design goals as well as the corporate partners involved in the project. The interface was presented in the festival as a real product not as a research prototype. Also, based on questionnaire data the users found many different uses for this kind of interface varying from video distribution to functioning as a puchasing point. Following the feedback, we believe that FizzyVis is a potential direction for future public multitouch information browsing designs for commercial walk-up-and-use interfaces.

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