Your answer will make an impression

Using Quiz Game Mechanics for the Collection of Visitor Data at an Exhibition

María Guadalupe Alvarez Díaz
Ulf Wilhelmsson
Mikael Lebram
Marcus Toftedahl
School of Informatics
University of Skövde
Sweden

***Abstract* — this paper presents the initial results from a project that aimed to collect visitor data at a traveling exhibition starting at the Regional Museum in Kristianstad, Sweden during 2014-2016. The project was intended also to contribute to the creation of an atmosphere "About time", which was the subject of the exhibit. We built a system that was integrated as an interactable part of the exhibition by using elements of quiz game mechanics in combination with elements of data based tracking applications and elements of visual art installations. The data provides statistics which are used to visualize the current status of the visitors' attitude toward specific questions about time, imprinting the visitors themselves an integral part of the exhibition. Visitors build a visual Game Ego when answering questions and at the same time provided statistical data that can be monitored and extracted from the system. The results show that we succeeded to some degree but more can be done towards incorporating game design elements to engage the user, such as feedback and challenge.**

Keywords— quiz games; survey techniques; art installations; digital applications in museum environments; tracking applications

I. INTRODUCTION

In January 2012 we were contacted by a representative from the regional museum in Kristianstad, Anna Hadders, and asked if our researchers and students would be interested to engage in a project concerning time. The project consisted of a long term study relative to the manner people experience time, through an interactive approach with teenagers: workshops, seminars, and the production of a traveling exhibition. Our participation in the exhibit consisted of the development of games and other artifacts that would put a light on humans' perception of and relation to time.

II. INSPIRATION IN TIME-CLOCK MACHINES

An idea we were asked to address was the use of a time clock as the emblematic time shift between buying goods and buying people's time to produce goods, by designing a system that allowed visitors to check in at the exhibition with a time clock, and to check out when leaving the exhibition. We found this to be quite interesting but also quite possible to do something more of: a system integrating some game mechanics powered with survey technics and visualizations, referring to abstract film animations in modern art. [1] [2]

III. THE QUIZ-TRACKING CONSOLE

The main question for us to address initially was how we would encourage visitors to interact with the time clock console and provide these data for us. Inspired by Higinbotham's Tennis for Two game, [3] which made use of people's playfulness, we decided to build the interaction based on a quiz. Having been working on slightly similar projects, we wanted to give visitors the possibility to modify or personalize the image represented in the screen while answering questions.

The questions shaped in a combination of riddle and a questionnaire would tailor the exchange. The formulation of the questions would trigger some thoughts and reactions as much as answers would provide input about and along the experience.

We chose to create an application able to read bar-codes or QR-codes from a business card; a time-credit card that would relate to the novel Momo [4], which was an inspiration for the exhibition in the first place, there people are lured to put their time into a time savings account; a punch-checking point where the visitor is instigated to an action that physically and mentally would relate it to the fact that her personal time is being counted.

We initiated with the alternative to develop a short, simple track-report database to store visitor's data with the possibility to represent a graphical path of each visitor in a ground plan, displayable on a regular flat TV-screen. The graphical display could become an interesting visualization when multiple visitor paths were added to the image, contributing to a spontaneous collective expression [5]. The interface would be an artifact with physical elements, e.g., the card that would be personal, something to keep in the pocket while roaming around; a number of stations would be placed at several positions in the exhibition area. Those would be boxes containing a card slot, a screen and an arcade machine style button. Visitors would check-in their cards in the box. The card-id, the station-id and the time would be sent via Wi-Fi to a server. The server would generate graphical statistics about the visitors. The images of the statistics could be displayed on a large screen and streamlined to a web page.

A. Developing a prototype

The basic requirement was to construct a robust and easy replaceable artifact; identically constructed and interchangeable. The number of consoles didn't need to be limited, it could work equally well with any number. The size and style of fonts should be readable to any kind of public; a bigger size of the console screen would facilitate the communication with the user. These requirements motivated the use of a computer with a monitor screen in combination with a bar-code reader instead of a smart phone or other type of mobile terminal. Having a display, optical reader, and Wi-Fi in a single unit was one of the main advantages of using a smart phone in the initial design. However, the requirement of an external display led to a new design, based on a single board computer (Raspberry Pi) running Linux. The cost of the hardware would then decrease significantly per unit, where the screen represents more than half of the cost. The Raspberry Pi facilitates HDMI output for the display and generic IO pins for the external buttons. Instead of using a camera and QR code, a standard bar code reader was modified and connected to the computer via USB. The bar code reader emulates a keyboard, which means that it sends a series of keystrokes corresponding to the code that is read. A website was made available to enter the card-code after the visit to see the answers chosen and its personal graphics. The database containing answers to questions from each individual generates statistical information about participation, counting information from the questions and track user movements.

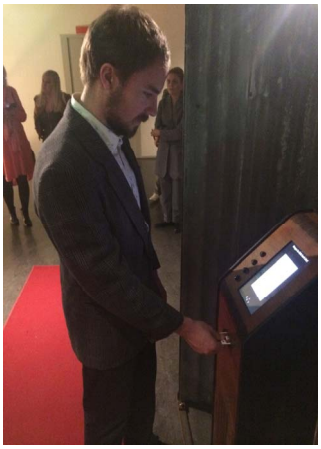

Figure 1. Check-in at the exhibit's entrance

B. Designing an interface

The alternatives explored in designing the exchange between the application and the card-user (the visitor) were a combination of texts in the form of instructions, dialogue, questionnaire or riddles and a graphic representation displayed on the console screen. By creating a specific query sequence in each individual record via the card-id, we supported the freedom of moving around the hall, checking-in at the various consoles and answering as many questions as they choose at any moment at any console.

C. The big screen - A collective creation

A visual component of the experience is a TV display with large dimensions, with a graphic visualization of Game Egos [6] participating in the quiz, forming polychromatic compositions based on answer statistics. The choices visitors make affect the form, the size, the color, the shape and the velocity of the movement of the objects on the big screen. More interaction with the user can be developed on this basis in future phases of this project following the tradition of creative experiences with digital forms. [7]

Libraries were built in the application to contribute with the normative criteria, containing catalogs for icons, questions and features, such as colors and scales for sizes, movement and distance. The icons were chosen to manifest the Game Ego of each individual; the uses of small icons such as emoticons are common in chats to express everyday actions and feelings in simple standard symbols. The normative approach contributes to create rules in the application as how the image would get constructed.

An editor was also incorporated to input the questions and to configure the graphics. This interface allows the user to pre-define the relation between the questions (input) the answers (selections) and its manifestation (graphics).

IV. Testing and Production

There was an opportunity to test the prototype in the environment of the Scandinavian Game Developers Conference organized in June 2014 by our university.

We observed that users had a smooth interface interaction by using the cards, checking-in and moving ahead across the questions; except that users frequently tended to answer by touching the screen instead of pressing the buttons. In most cases participants used one console only.

The big screen was intriguing at first, until viewers figured that patterns and shapes repeated its movements, hence it derived the idea of expanding the configuration of images.

Statistical results of this test showed that 773 answers were received from over a hundred participants, which means an average of 6, 5 answers per user. It also presents that 26% of all users answering the first question did not continue to the second question.

A. Production

By entering the production phase with the exhibition's art designers Eric Langert and Per Petersson the physical console adopted a shape inspired on the steam punk theme of the exhibition. It also required adjustments to fulfill visitor's impairments. The result was a wooden old-fashion check-in terminal in the form of an old radio with black buttons aligned vertically; also a smaller rectangular screen replaced the big computer display used in the prototype of the console.

B. *Features and Visualizations*

The overall system works similarly to its prototype in terms of data acquisition, database as well as data visualization. Differences with the prototype strive on that the Game Ego built shows up momentously at the first check-in at the console screen, providing the user with a direct reference to how choices can influence the Game Ego. At the bottom of the screen the user see a tiny reference to the living Game Egos distributed in the other consoles at the exhibit hall. The user could check-in only once at the console situated in the entrance hall, allowing the user to continue to other stations; it also helped to avoid long queues when larger groups were visiting.

The application is web browser based; every time the visitor checks-in generates a transaction modifying its register in the database in real time. The big screen visualization is also web browser based. It displays the visitors' Game Egos. It is possible to customize the image through the user interface, making easy to adjust the icons catalog, the chromatic parameters and the texts providing unlimited usability options.

Several modifications were necessary to adjust the big screen image to the exhibition environment, such as the background and the shifting between multiple visualization models. Two big screens and four consoles were displayed along the exhibition hall. TV-screens were also framed and re-contextualized to fit the museum installation.

V. Initial Results From the Exhibition in Kristianstad

It was observed during the exhibit that users, maybe captured by curiosity about the console and the card, were willing to initiate in a quiz format with the first question. Statistics show that 12% of the users didn't continue to the second question.

The data collected is sorted and reported in tables, making the application a very rich source of information on mood and roaming of visitors in the exhibit. The statistics shows that Sunday and Wednesday were days when visitors showed more willingness to answer than other days of the week, being Monday the day with a drastic drop. It also showed an important drop after the fifth question, we believe that this single question, in which the visitor gets feedback, was interpreted as the end of the play.

A. *The Aesthetic Component*

The big screen produced the effect of a collective expression built out of the visitor answers [7]. In the following image each Game Ego makes satellite movements leaving a track created by brushstrokes. The Game Ego movements

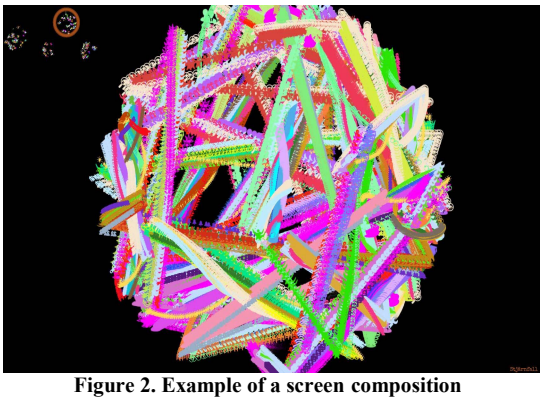

Figure 2. Example of a screen composition

evolved into switchable scenes forming compositions about the mood at various locations in the exhibit hall.

"Falling star" is the title of the composition above with a small mapping of other consoles in the hall in the upper left side.

The image below is a different composition named "Upline". When this image is in movement it can be seen each

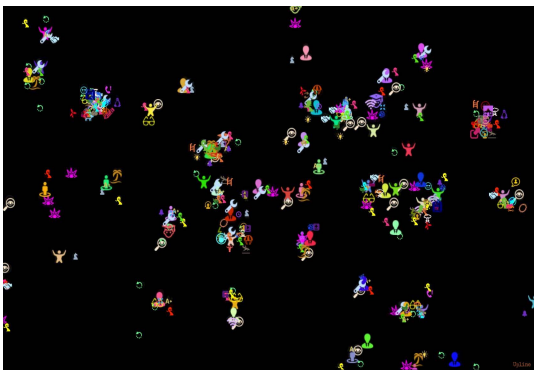

Figure 3. Visualizing Game Ego's manifestations

Game Ego built of multiple icons; each icon correspond to one answer. The assembling of icons rotates around the Game Ego, and moreover, they can combine movements with other Game Egos as part of the variations established in the parameters for each composition.

VI. Conclusions

With this interactable application participants subscribe themselves in the creative collective artwork. Alternative roles of audiences and creators speak of the need for appropriate ways to incorporate motivations, interests and perspectives of the public in the museum proposals to accommodate their

participation. While there is an open disposition to new experiences the public is not necessary conscious of the possibility to live it collectively.

It is possible to know the flow of visitors to the exhibit hall in detail. The system reports data collected from each visitor registered. However, to contribute to a valid and useful data, is important that the access entry to the exhibit hall is designed for a fluent individual check-in at the first console - and to subsequent consoles - allowing a personal use of the cads.

We interpreted the results of a period of one week in the museum as evidence of the mood of the public visiting the exhibition.

The application and its consoles incorporate elements from quiz mechanics, reflections on the subject of the exhibition, elements of art installations and survey questions. It is a process of creation of expressions, adding to the living state of the environment. The application based its features on the collection and sorting of data of living events producing chromatic combinations of specific moments experienced in collectivity during the exhibit.

VII. Future Work

Approaching to public in the museum with these consoles is a starting point to achieve dynamic interventions on the content of an exhibition from any participant. It needs adjustments in the incorporation of its parts to reach a balance in the experience: as a game, as an artistic installation and as a survey tool.

It is obvious that our installation has some flaws and that the number of answers drop off steeply after just a couple of questions. It needs to be more of a thought through quiz game design in its essence and not only on its surface. As a quiz game, it does not really work as well as we hoped maybe for the lack of feedback given to visitors. We also think that more playful questions will result in better response rates.

The awareness of users to intervene the visual compositions may rise by increasing the interactivity with the screen console, facilitating feedback to visitors. Existing reporting capabilities allow statistical information and the Wi-Fi connection supports real-time counting. Those are features to consider in future design.

A following step in collective compositions is the incorporation of sound and music to the installation, especially as the console cabinet for this exhibition already has the shape and the space to incorporate speakers.

It would be interesting a deeper exploration on the aesthetic dimension of this project. The consoles, the screen and the application can be seen as components of an art installation, expressing and sharing experiences between participants.

The application seems suitable for development in areas of marketing survey; database, application capabilities and interface can be customized for diverse events involving many participants. The external shape of the end terminals can be adapted to the particularities of the event, taking the form of game consoles, information terminals or some other external appearance.

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