

USABILITY TESTING AND THE DIGITAL FACSIMILE OF MAP OF MEXICO 1550

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ABSTRACT

The Digital Facsimile of Map of Mexico 1550 is a work in progress of Systems of Representation research group in Media Lab (http://cipher.uiah.fi/Systems_of_representation).

This paper describes the usability test carried out as a part of the interface design to further develop the Digital Facsimile of Map of Mexico 1550. The working method used brought insights regarding the social and individual subjective experience involved in navigating an interactive piece. The work also triggered reflections related to user testing and experimental methods employed. It also defined the guidelines for the second version of the Digital Facsimile that is presented from May of 2003 at the *Gropius Bau* Museum in, Berlin, Germany.

BACKGROUND: THE MAP OF MEXICO

The map, that is thought to be the work of the noted Spanish cosmographer, Alonso de Santa Cruz, is one of only two known maps that give a fairly accurate picture of the city of Mexico and its surrounding regions in the mid 16th century. The clearly drawn roads over the mountains to other parts of the country permit us to retrace the routes taken by the Spanish conquerors. The map also gives information about the ethnography and the flora and fauna of the region. The population is shown performing a variety of activities, such as woodcutting, canoeing, hunting, and fishing. The approximately 150 glyphs on the map, representing human and animal heads, feet, hands, circles and stars, refer to name places.

The concept of the Digital Facsimile

Printed and material facsimiles of historical and archival artifacts are frequently used by scholars for research, as valid replacement for working with the original. For reasons of security and preservation, facsimiles are also routinely used in exhibitions by museums and libraries. Because of their value and rarity, printed facsimiles are usually also exhibited in glass containers, where they are out of the reach of the public unable to peruse its contents. In contrast, researchers and audiences frequently raise questions about both the accuracy and consistency of digital artifacts, with regards to their material counterparts.

In spite of the fact that digitalization could solve many problems regarding access to rare and unique archival materials, traditional image scanning techniques do not properly address many of the needs and issues of museums and libraries that also happen to be major research centers. For one, these methods cannot accurately transfer radiometric and volumetric properties of archival items made of organic materials, such as parchment and vellum,¹ and which through the passage of time have acquired an almost three dimensional topography. A sizable amount of archival artifacts in European libraries belong to this category of parchment items.

The Map of Mexico 1550

As used in this project, the concept denotes a digital representation of the original object of such a high quality, in terms of resolution, color and shape accuracy, that it is accepted by researchers who would normally require to get access to the material version of the object. This is a significant feature that distinguishes the proposed solution from other “postcard” or “videogame” quality solutions, which are mainly intended for non-expert audiences and experiential purposes.

Digital Facsimiles offers significant benefits: protect the original from excessive use, make the material available in the best possible quality to the widest audience, reconfigure and augment—it can be made a part of new works and an intensive data acquisition strategy to ensure that there will be enough for future generation products.

The reconfigurability and augmentability makes it possible to develop diverse types of digital cultural heritage artifacts targeted to different audiences.

THE GAP BETWEEN A PROTOTYPE AND A PRODUCT

The gap that exists between the model in the designer’s mind and a final product that can be successfully employed by people has been a subject of research for quite some time. Donald Norman, for example, talks about the system that is the outcome of the designer’s effort and the system that emerges as a result of the user’s interaction with an artifact. Between these two is a gap that results from the fact that designers do not really communicate *directly* with the user but rather, *through* the system image.² The system image results from the physical structure that has been built. In the case of the map, this includes the type of projection screen utilized, the tools for interaction itself, and the types of screens available in addition to the map itself, such as the introduction and the help screens.

Yet in spite of the very thorough usability testing that can be done, at a more basic level, we will still have the situation of being confronted with the indeterminacy emerging from complex system of interaction. As Nielsen points out:

“A basic reason for the existence of usability engineering is that it is impossible to design an optimal user interface just by giving it your best try. Users have infinite potential for making unexpected missing interpretations of interface elements and for performing their job in a different way than you imagine.”³

In this context, the main objective of the user testing was to evaluate and to improve the already existing interface designed for the artifact. Additionally, we wanted to find out how the usability of the digital replica could be improved without losing the facsimile quality of the item.

USABILITY TESTING AT THE MUSEUM OF CULTURES IN HELSINKI

The usability tests were conducted in March 2003. During four consecutive days, we carried out a series of interviews in the Museum of Cultures, Helsinki in order to test the current application and to set the guidelines for future steps.

A detailed user test plan was created before the interviews, and some reformulation of this plan appeared as the interviews were carried out. The people interviewed include some that were especially invited as well as normal visitors to the museum. For each of these two groups, we prepared a differentiated set of tasks and questions. Some of the people invited were experts in anthropology, history and education. All interviews were video recorded for later analysis.

This was a special usability evaluation test, because the visitors to museums are a huge variety of people. At the same time it was not possible to generate the conditions of a usability laboratory. The advantage of this situation was that we collected a large amount of data coming from different sources.

The disadvantages were that it was not possible to isolate the place, so in several interviews we had other visitors to the museum observing the test. In these cases we observed the reactions and comments of them, and consider this as a part of the data to analyze.

During the interviews, we tried to answer the concerns about the interface using an open format for the questionnaire. We asked some questions from all visitors, but depending on the performance of the user, we chose the order of them. We also left some time for improvisation speaking freely about the project.

We were as impartial as possible, not solving all the problems immediately, so as to stimulate the visitors to find their way in the application. Sometimes it was difficult not to help once we were there in front of the screen too, producing a dialogue with the visitor. Anyway all the observations were based on the moments when the users needed help, trying to identify which features were difficult or impossible to access without help.

General characteristics, usability, and functionality

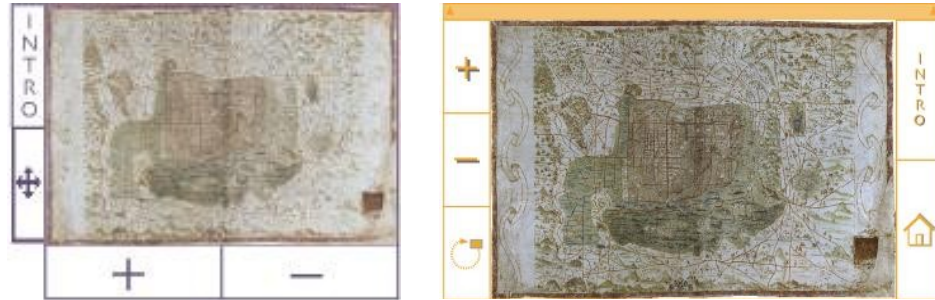
The usability goals were to make the navigation easy to understand, to find details of special scientific interest and / or to have a picture of the whole map. With these objectives in mind, the interface aimed to enhance the experience of perusing through the map by giving the viewer an extreme close up view of the details, providing the feeling of touching the map, allowing for navigation according to different rhythms and creating the feeling of being in front of an augmented version of the map.

These objectives translate into a certain number of functionalities in the interface tool, or button area (BA) such as: zoom in button that zooms up to the **magnification of 16 times the original**, zoom out button that zooms down to a view of the whole map, intro button that leads to the first page of the application and moving button that allows the user to move the button area.

There is a reduced map image to orientate the user in the navigation of the map, with a rectangle that frames the area currently in the screen. It is possible to touch a section of this small map and to focus the whole screen image in this point, with the same zooming level that was on screen before.

Out of this button area also exists the function of dragging the map to all sides.

Observation and concrete problems identified



button area before and after

The observation was based on the first version of the interface. It was classified by the features, functions and possibilities of the application. Here is a list of some of the problems that we could identify:

The Moving button had an icon whose meaning was unclear. Nobody being asked before pushing could imagine what was the function of this button.



Intro was a button that suggested to most users that it led to more information about the map. It led to the first page of the map that did not have much information (only title and developers information). Most of the interviewers were very curious about the map, asking a lot of questions related to the original map and to historical facts. As the whole button area was positioned in the bottom right corner of the screen, the buttons that were in the upper left corner were the most visible. At the moment the intro button was in this privileged position, which suggests the users to press this button before the others. This was not beneficial, since the first movement for some visitors was to come back to the first page.

Most of the people tried to drag the small rectangle that was in the Button Area. In doing so they touched different points of this small map. The delay in this function provoked people to continue touching in this area without understanding the results. The program remembered all the points touched and began to jump, confusing the user.

The buttons should work only when they are touched in the center. As the border between a button and the small map was so thin, there were some misunderstandings. Sometimes users wanted to push the button and they went to the corner of the screen because in fact they were touching one point inside the small map of the button area.

Since the function of dragging and moving the map was not done from the button area, some people did not find it at all.

The map could be in a position occupying only a quarter of the big screen. This position made the map unattractive for the next visitor, who would find a quarter of a map image.

We did the test in a big touchable screen, unfamiliar gadget for most of the users, they could not realize that they could touch it, unless they were specifically invited to do so.

From the observations to the new version

The test was a useful way to identify problems. This section is extracted from an interview:

“Subject 1: Intro...

Subject 2: Yes, intro.

Interviewer: Where do you think this button will lead you?

Subject 2: Something about the history of that... the background of the whole project. [she presses it and arrives to the intro page.]

Subject 1: No, it is just the begging.”

Some suggestions that came from the users were implemented, for example the changes made in the intro screen. This section is extracted from yet another interview:

“Interviewer: When you go to the intro, which kind of info would you like to have?

Subject 3: No just the date, as much as I know about the original, about where is it know, more about the library, and the actual material, the physical material, the size, basic data that you can relate this version to the original artifact. The story referring to the original sources, because this seems the original, but is not the original.

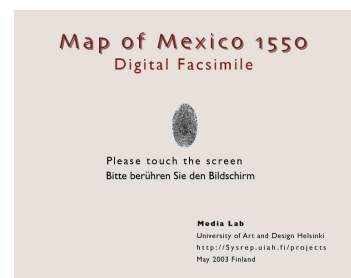
Interviewer: Do you think it was difficult to understand how to navigate it?

Subject 3: It was easy.”

General description of principal changes in the new version

After this observation we defined some issues for the actual version. This version was especially developed for the museum context where it was meant to be exhibited (*Gropius Bau* Museum in, Berlin, Germany)

The first screen has a sign inviting the visitors to touch the screen, the title of the project, information about the developers (Media Lab) and the web site where people find more information about the research project.



The intro screen has some extra information that relates the facsimile to the original map, and also historical details. For the intro and help screens we did a version in German.

A Help screen was added. It can be reached from the Intro screen. This help is clear and simple in order to guide some users in the first steps.

In case nobody has used the digital facsimile for more than two minutes, and the application is placed in the Intro or Help screen, it automatically goes to the first screen. This is to avoid that visitors believe that there is only something to read and they don't dare to touch the screen (in Help and Intro pages they are not invited to touch the screen). The function of moving to other smaller area inside the map by touching inside the small map in the button area was eliminated since it was not relevant in a museum application.



The button for moving the button area has a clear symbol (the bar and the arrows) different from the others. This is because it is a button that affects the button area and not the image of the whole screen.

The buttons inside the button area were repositioned in order to have the zoom in button (the one that in general is used at the beginning) in a privileged position.

The color of the buttons was changed because gray suggests inactivity in a better way than blue.

A reset button leads to the first and whole view of the map.

Social and individual subjective experience

Part of the answers we received were positively influenced by the fact that the interviewees knew that we were doing the survey on a project that we had done by ourselves. This fact did not prevent the exchange of opinions, and as a matter of fact we received a lot of good intentional critic.

In order to enjoy the potential of this map, one needs a bit of time. The persons that came to the museum took the time (**most of the interviewees** came especially to see the map) and they had positive reactions towards the map. They found it especially pleasing to drag and move the map with their hands on the screen and to have the possibility to see in detail an interesting part of the map.

People tried to find in this application the same features as they are used to find in most of the interactive media CD-ROMs. They were clicking on different parts of the map in order to "open" other links with different information.

We informed why we didn't want to put links in the Digital Facsimile version, and we explained the concept of digital facsimile. This concept was not easy to understand.

There are two ways to experience the map, social and individual. The social experience happens when there are more than one person in front of the map. It can be that the other person, the one not touching the screen, enjoys it passively, or gives suggestions of how to use it. In both of the cases, he/she is actively participating enjoying and navigating the map, with the rhythm of the one that is actively interacting.

There was one case in which we interviewed two persons at the same time (they didn't know each other from before). One had a negative experience of the map, demanding the features that a normal CD-ROM has. The other person, though being influenced by the negative comments at the beginning of the interview, had a generally positive reaction at the end, and she made a lot of suggestions and enjoyed the experience.

In some cases it happens also that two or more of the users wanted to interact with the map at the same time. The big touchable screen motivates several users to approach simultaneously. The application is a single user application, so it was not prepared for this kind of use. But the users in such cases found a great deal of fun, observing the unexpected movements. This happened once with a group of girls of ten years of age, and another time with two boys of around 27. The older people interviewed were most precautious, waiting their turn to approach the map but giving advices or suggesting what to do.

FUTURE DIRECTIONS

These future directions are the ideas and comments gathered during the user test related to developing an interactive piece for museums. We did a compilation of them, although they could only be implemented in a long-term period as a tool for future use.

Some of them, as the following one, were coming directly from the interviews, while others were part of our analysis. This section was extracted from an interview with Pekka Korvenmaa

“Salgado: if we plan to further this project, which kind of information are you interesting in having?

Korvenmaa: well perhaps as an attachment, a kind of written index, let's say buildings, or harvesting, or churches, and this kind of things. And there might be a kind of index of the content, make by you. But this is kind of difficult because if you say church you might have 15 churches, so how do you know which one it will lead you. That might be a difficulty”.

The speed of the zooming was a controversial issue. While some users were comfortable with the zooming others, complained that it was not fast enough. It would be challenging to design an interface with different zoom speeds while trying to keep the button area simple.

In the new version, there is a screen saver only applied to the written pages, and not to the main part where the map can be navigated. But there remains the problem that the map could be in a position occupying only a quarter of the big screen.

The screen saver could have a sensor placed in the surface in front of the screen, and

when there is nobody, it would automatically reset. In that way it would not disturb users changing the image when it is not the right moment.

The content of the screen saver could be a video projection or animation that shows how to navigate it or else shows a projection of the map in motion. A dummy person using it could be shown as a first screen, so as to motivate the user to touch it.

These are suggestions from the interview with Inés Andersen and Ruth Rubin:

“Andersen: why don’t you put a back button, so it will come quickly to the previous stage, where I was just some minutes ago, and now I don’t know how to return?”

Rubin: “It would be good that, while pressing on a button, there is a word expressing the function in words, too”.

In addition to the version we did for the Gropius Museum we planned a help for the audio tour that the museum offered. Unluckily and because of tight schedule it was not put into practice. The idea was a dialogue between two hypothetical users navigating the map. This characters were giving suggestions and motivating the use of the features that were generally underused. In the future, an audio feedback could be used not only as a help but also to enhance the experience, giving a new dimension to the navigation.

Here we allow us to add an idea that has an open format and will not necessary be a part of the Digital Facsimile, but a separate feature that could contribute to the museum installation proposal. The idea is to produce a dialogue with the visitors. It would be interesting to record the comments and questions from visitors coming at different times to the museum. It could also be a way to produce an installation with the visitors. Without forgetting that a tool of these characteristics could be a research tool for people tracing parts of the map, or memories that the map inspired. On one hand, some visitors will be given the possibility to leave a track, to tell their comment. On the other hand, the visitors could be passive listeners to the stories that someone else has about the piece. This audio device could be not only used to be a recipient of comments but also of questions, ideas, stories, and anecdotes that are related to the Digital Facsimile of the Map of Mexico 1550.

CONCLUSION

The digital facsimile intends to give the user the experience of being in front of an augmented version of the original map.

The current design represents the culmination of the first stage of the project. It is an interactive display that provides visitors with an *easy* and simple way to handle the digital replica. It also allows detailed examination of the item. During the second stage, a 3D stereographic model incorporating volumetric data derived from the already existing photographs of the map will be produced. A website version that displays the map and also allows for compilation, dissemination, and sharing of information is also being created.

The potential future directions are to propose product solutions that involve the creation of a museum piece, a professional research instrument, and an educational tool. As a museum piece and as an educational tool, the objective will be to extend the project

into an interactive media exhibit that includes data related to Mexico City, thus tracing a link between the historical features and the current daily life in the city. As a professional tool for the researcher, the Digital Facsimile will have a the volumetric data and sound feedback that closely resembles the original version.

The results of this evaluation validated the three potential future directions for the project since the user test indicated the necessity of having differentiated interactive products for the three probable contexts of use. At the same time, it confirmed that the expectations of different users can not be fulfilled in a universal efficient tool. The project will benefit if these three directions are developed in parallel. In that way, we will have the possibility to compare issues about the roles and implications of an interactive media project tied to its context of use.

- ¹. Brown, Michelle. Understanding Illuminated Manuscripts, A Guide to Technical Terms, The J. Paul Getty Museum and The British Library, 1994, p. 95. The term parchment is used generically to denote animal skin prepared to receive writing, although it is more correctly applied only to sheep and goat skin, with *vellum* reserved for calf skin. In the 4th Century, parchment supplanted papyrus as the most popular writing support material and was not replaced by paper until the 16th Century, with the rise of printing.
- ². Norman, Donald. The Design of Everyday Things, Basic Books, New York, 1988.
- ³. Nielsen, Jacob. Usability Engineering, Academic Press, Boston, 1993, p.10.