5 FREE THE VISITORS: THE MUSEUM'S DOCUMENTATION THROUGH INTERACTIVE SYSTEMS

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Introduction

More and more, Museums have educational objectives and visitors want to take part in the activities proposed. Interactivity and multimedia are tools that help reach these objectives. These tools may be used to place the visitor in a complex environment of learning and research. Since the Musée de la Civilisation opened five years ago, visitors have been able to explore a number of interactive systems in the exhibitions. As a result of these experiences, as well as from the development of technology and the needs of visitors, the project SIM emerged. It has been organised around the many facets that define interactive multimedia systems.

In this paper, we will identify the research themes of SIM. We will define uses of interactive systems that add documentation to exhibitions of interest to the Museum; that is one of the primary objective of our research project. But before that, we will define the project in its context and its limits.

The project

SIM can be integrated in the third phase of MUSIM. MUSIM is an automated system which manages the museum's collection, integrates images and information on the artefacts. It can be reached through a network, between the Musée de la Civilisation and its reserve in the Town of Vanier, near Québec, where the collection is kept. It is used for the management of the collection and for the planning of exhibitions. The data is managed by ORACLE, HyperCard being used for user's interface. The analogue images are stored on videodisks.

Our project is a result of a partnership between the Musée de la Civilisation, Collège de Limoilou and Cégep de Ste-Foy. It is funded by the Ministry of Higher Education and Science of Québec in a programme promoting technological transfer from higher education institutions to the private sector. Teaming up professors from three programmes and two colleges, it allowed interdisciplinary exchanges from computer science, electrical engineering, design and pedagogy. The members of the team were Suzanne Jean and Michel Sévigny from Collège de Limoilou, Thierry Gros from Cégep de Ste-Foy, Jules Morissette, Martin Levesque and Lyne Labadie from Musée de la Civilisation.

SIM aims at the conception and development of interactive systems that can be used in exhibitions. This project has provided, in particular, a prototype that permits the exploration of various aspects of interactivity: user interfaces and technology for multimedia. We have also experimented with the use of the public network ISDN which allows the use of interactive systems from a distance.

While building a prototype that can be used for further development of applications, we did not aim at a usable system for an exhibition. We do think however, that it will help anyone interested in the use of interactivity and multimedia in a museum context to compare and evaluate the many different problems that we tried to solve and the solutions we explored and experimented with.

The prototype will not replace the interactive systems built for special use in a specific exhibition, where, for example, there is a need to promote simulation or provide specific games. In developing a multiuse interactive system, our project joins the field of information systems developed to help the general public have greater access to the museums data banks and their general and specific collections.

Some thoughts on interactivity

One of our preoccupations was to define the principles and rules that govern the use of interactive systems in the Museum. Particularly in systems, such as ours, that aim at a larger use by the public of visual and textual information present in a museum, but not directly accessible in an exhibition.

Interviews with exhibition project managers, at the Musée de la Civilisation, showed that only 5% of the museum's collection was used in most exhibitions. Furthermore, many artefacts and documents gathered in the preparation of the exhibitions are never used. These facts combined with our desire to let visitors have access to the information presented in MUSIM, guided us in the definition of the structure of our prototype.

Interactive systems used in exhibitions can add useful information by giving access to large data and image banks pertaining to the exhibition theme. Also they can give the visitors new experiences and other forms of interaction with the exhibition.

Giving new information on the social or historical context of an artefact or adding virtual objects not physically present in an exhibit can considerably enlarge the meaning of an exhibition for someone who wishes to find out more than the material directly presented to them in the exhibition.

Taking into account the nature of our collection based on heritage artefacts, many visitors ask for more information on artefacts they recognise. 50% of donations to the Museum are made by visitors who have seen some kind of artefact they have at home or in the family, in an exhibition.

An interactive system allows the visitor to explore different aspects of interest to him or her. It is a way to personalise an exhibition. Experiments made on interactive systems show that visitors like the opportunity of choosing information according to their interests and find that these systems are useful for that (Cité des Sciences et de l'Industrie, 1991). These systems enrich the classic information usually found in exhibits.

The use of the prototype

As we have seen, the first aim of the prototype is to add information on the artefacts and themes of exhibitions.

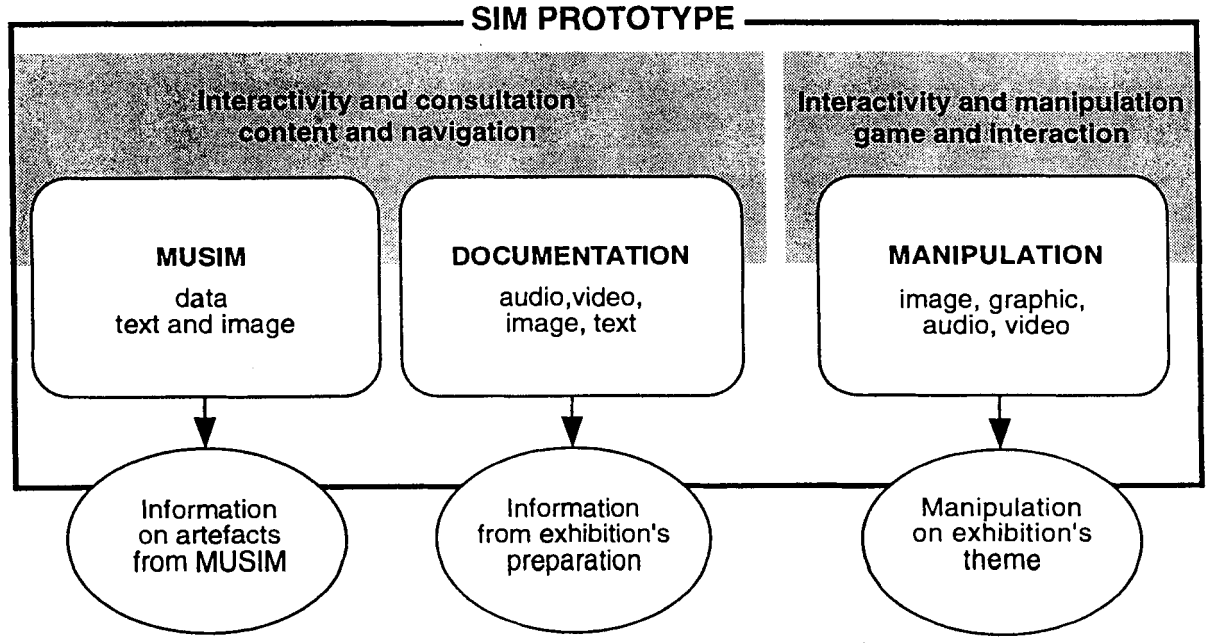
Another aim of the system is to play an integrative role in the experience of the visitor in the Museum and its different exhibitions. It will act as a known medium, as a focus point. Familiar with its manipulation in different environments and contexts, the visitor could engage in a dialogue with the Museum on many different objects, always in a friendly mode known to him or her.

Even though we are aware that many assesments of interactive systems (Cité des Sciences et de l'industrie, 1991; Allison and Gwaltney, 1991; Wanning, 1991; Nash, 1992) show that the visitor's interest span is short (under five minutes), we still decided to build an interactive system. This system is based on documentation giving detailed information on the museum's collection and other material gathered in preparing for an exhibition. However, the habits of the visitors when they use such systems will be taken into account. Our prototype will permit us to build a standalone system the visitor can use for a short period of time. Each element will give detailed information on one subject, rapidly. The visitors will be able to use it for as long as they desire. Many visitors are interested in a small number of exhibits but would like to concentrate more fully on a few subjects. With our system, this will be possible. We also take into account that a great number of visitors at the Musée de la Civilisation are frequent guests, are faithful, middle aged and well educated (Allaire, 1992). They should welcome a new way to have access to a collection otherwise denied them.

The structure of the prototype (fig. 1)

The prototype could be made up of three parts for three different uses: the first part gives access to data on the museum's collection, the second one to multimedia documents (audio, video, images, graphics, text) related to an exhibition and the third one proposes manipulation. The manipulation mode is there to help integrate what has been learned and proposes an interaction that is like a game.

Fig. 1 Structure of SIM Prototype



The first two modes of the prototype are mainly documentaries. They are used in a consultation mode. These modes of interaction place the user in different contexts of learning, using short or long memory, more or less self implication.

In the first mode, the user can choose a theme or a kind of artefact among those presented. Some artefacts available in the system are represented by small pictures. The user can enlarge the artefact of his or her choice. This artefact is presented with images and a structured text with different levels of detailed information. Also, video or audio documents are available, with short clips, which show the artefact in use or during its fabrication, or other subjects. The visitors can find, based on a thematic research with an indexed mode, other artefacts with which he or she would like to become better acquainted.

In the second mode, the user can choose between multimedia documents related to the exhibition's theme or the artefacts. That documentation is accessible through an index in which the user choose the documents that he or she is interested in, offered by subjects.

The design of the third mode is mostly related to the objectives of a specific interactive system. In the prototype, we built a small game that aims to put together some artefacts related by their meaning, according to the documents that presented them, in the other modes of the system.

The prototype was conceived like a shell reusable in many exhibitions. It will not be necessary to program again. For each application, most of the program will be the same, with user interface and information newly adapted. Depending on the need, only one or all modes can be present in an application.

Research objects of SIM

To develop the prototype and reach its objectives, we needed to examine two important concerns: user interface and multimedia technology.

The user interface concerns

The prototype was built based on the research made on interaction modes, on user interface and on its formal and functional elements. Some rules or guidelines were defined: the mastering of the system has to be intuitive and the user is the manager of his or her travel through its information. He or she must get help and orientation to find their way, in French or in English. The user must be able to access the system for a long or short period of time, as he or she wishes and they must always be able to consult either a small part of the information available or all of it.

Two grammars with guidelines on formal and functional aspects of user interface were developed. As the system grew, these grammars were corrected and enhanced according to the tests done.

The formal grammar is concerned by all elements of design related to the graphic part of the system: screens and interactive objects. We studied and led many experiments on this subject: screens, typography, space for text, space for image, graphics and interaction (buttons, menus, icons). We consider that the screen proposes a working space as well as a movement. All this must be defined with specific ergonomics related to the museum's special needs in interactivity.

The functional grammar needs to define ways of presenting information, guiding the user and following the user's actions.

In these guidelines, we define each element related to the action of the user and the behavior of the system : going in, using and going out the system, looking for help, knowing what to do. We adapted guidelines for general user interfaces to those useful for museum's public systems.

For these grammars, we had to define a well-adapted interface. The design of the system has to consider what the user's mental representation of the tasks will be and how to achieve them. The match between the logic put into the production (by the designer) and the logic of use (user's) achieves a good use of the system. During the development, we ran many tests in order to make the system more friendly to new users and so it can be easily understood.

Integration of multimedia technology

The research and development of the prototype gave us the occasion to identify and evaluate different solutions which render the integration of multimedia in an interactive system easier. We studied several media with different concerns : digital capture, compression, storage and use. We compared the graphic and video adapters to digitise and compress still images and video. We tested and evaluated different techniques in the context of an interactive scenario. The prototype contains some digitised images with different levels of colours (to compare their visual quality), digitised and analogue video (to compare their access speed and storage requirement) and audio (to evaluate output). The data on artefacts was transferred from MUSIM to the prototype in an automated way.

The hardware used to develop the prototype is an Apple Macintosh Quadra 950, 16 MB RAM, 400 MB Hard disk, a graphic and video board from RasterOps (24STV and MoviePak), a Panasonic videodisk player. Many softwares were used to prepare data and documents : Adobe PhotoShop, Adobe Premiere, RasterOps Media Grabber and Still Compressor, Electronic Arts Studio 32. The interaction was programmed with Macromind Director in a way to make some reusable code. We needed all these resources, and more, to work without wasting time. Large pictures, digital video and software take a lot of memory, RAM or Hard Disk and great processing.

The hardware used for the exploitation of the prototype is an Apple Macintosh CENTRIS 650, 16MB RAM, 400 MB Hard Disk. A RasterOps display and video adapter is needed for higher quality digitised video. To decompress images, it is not necessary to have the video adapter : the decompression is done in a software way with Still Compressor or QuickTime which takes a little longer time wise but costs less.

We found that it is faster to work with animated graphics in 256 colours; but it is better to show pictures of artefacts in a million colours. The digital video is useful for very small clips as they use a very large amount of memory and considerably increase the material environment needed to run such interaction. Also, at least for the present, the solutions for very good digitised video (640 by 480 pixels, 30 frames per second) are very expensive.

To make good interactive systems, it is necessary to program almost all functions to go over the simplest possibility the authoring systems offer (i.e. Claris HyperCard or Macromind Director).

The choice of hardware and software depends on the context of use and also on the kind of data involved in the system. After having defined our needs, we looked for available products and asked for advice, in the Macintosh world. Apple Canada, Micro-Logic and RasterOps lent us material used to support our experiments.

Another experiment of SIM : Use of MUSIM outside the Museum.

Readers may be interested in another experiment made in interactive multimedia systems (SIM). We evaluated the possible use of MUSIM outside the Museum. We tested the ISDN technology (Integrated Services Digital Network) which is a new communication standard using phone lines. This standard is already used in Europe, particularly in France in the Numéris network. As its use was being planned in Canada, we wanted to know if it would be efficient with interactive systems containing images.

For this part of the project, we found a way to use MUSIM outside the Museum. We used it from University Laval de Québec, from the Canadian Heritage Information Network (CHIN) in Ottawa and we tried to test it at the AVICOM Conference in Pordenone, Italy.

Analogue images on videodisk were digitised with the RasterOps adapter with MoviePak. They were compressed in Apple Photo JPEG and MoviePak formats. Images of an average size of 350KB (467 by 256 pixels with 24 bits by pixel for colour depth) were compressed to as little as 6 KB. MUSIM was adapted to show images of an artefact on the same screen as the text. Tests on decompression were done with both different hardware and software decompression. At this time, considering the cost of material decompression, it is better to use software than hardware to decompress small images. However, it was useful to compress them with hardware, in files as small as possible for transmitting on public network. The networking environment was based on a bridge to join two local Ethernet networks through ISDN public link. We used a bridge IMAC from Digiboard which performed perfectly.

Our experiments with ISDN and the bridge used were of great interest to us : we joined two local area networks already installed without having to change them, ISDN increased considerably the transfer rate on public link (128 KB/seconds (2 channels of 64 KB)), enough to transfer images without a long wait. After asking for an image of an artefact, the length of time to search for it on the server, transfer it on ISDN link, decompress it with software and display takes around 6 seconds; only 1.5 seconds were needed to search and receive it.

So, our experiments using a client-server system through a large area network added to the other projects on standards and museum networking. Furthermore, it showed the interest for museums to go outside and serve other specialised publics, universities for example.

The SIM project has given the Department of Technology of the Musée de la Civilisation some expertise on the use and design of multimedia interactive system. The results of the project (texts, guidelines and prototype) will guide the design of new systems. The ISDN part of the project experimented communication by networking through museums, promoting exchange of data and ideas.

The SIM project does not close the debate on the use of interactive systems in exhibitions. New objectives for the participation of the public in museum, the improvements of technology and the public's need render the definition of the objectives for interactive systems than the use of technology itself more important. The formal and learning qualities of the products will ensure their success.