Preparing Personalized Multimedia Presentations for a Mobile Museum Visitors' Guide – a Methodological Approach

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Abstract

Multimedia provides new opportunities for museums to enhance their visitors' experience. However, its use poses new challenges for presentation preparation, among which are: How to enrich the visit while not diverting the visitors' attention from the actual objects in the museum, which should remain the focus of the visit? How to provide a rich information space suitable for a wide variety of visitors? These challenges need to be addressed during planning and preparation of information presentations for mobile, multimedia museum visitors' guides.

This work presents lessons learned about the preparation of multimedia presentations for museum visitors' guides in the course of the PEACH and PIL projects. While planning the presentations, the designers need to consider the exhibition as a whole, its objectives, its objects, and the information in which users may be interested. Then, in light of the resulting generic goals, elicit relevant text and images and combine them using cinematographic techniques into integrated multimedia presentations. All the above is abstracted in a nine-step multimedia presentation preparation framework, described in this paper.

Keywords: Multimedia Presentations Preparation, Mobile Museum Visitors' Guide.

Introduction

The learning experience that takes place in museums nowadays is free-choice. It tends to be personal; it is self-motivated, self-paced, and exploratory by nature. The visitor chooses what, where and when to learn [McLean, 1996; Falk and Dierking, 2000]. The museum guidebook was the original portable interaction medium, designed to support the visitors during the learning experience. It was later enhanced by the audio guide, a more technological medium which is commonly used nowadays. Audio guides free visitors from having to read text panels, and thus allows them to concentrate on the exhibits [Evans and Sterry, 1999].

The portability of the audio guides can be combined with the level of interaction and media richness of CD-ROM and interactive multimedia kiosks. This fusing of technologies resulted in a portable computer with an interactive multimedia application called "GEMISIS 2000," whose use was demonstrated in the "Fibers, Fabrics and Fashion" section of a museum gallery featuring a textile mill at the museum of ????. The findings of an evaluation of "GEMESIS 2000" showed that portable computers are popular with visitors, enhance their learning, and increase the time they spend in the gallery [Evans and Sterry, 1999]. However, the size and weight of the portable computer and its display are critical for museum application [Sparacino, 2002]; indeed the least-liked aspect of the portable computer in "GEMISIS 2000,", was that it was too heavy [Evans and Sterry, 1999]. Personal Digital Assistants (PDA's), which were found very effective because of their smaller size and lighter weight [Sparacino, 2002], have therefore been introduced into museums [Not et al., 1997].

An example of PDA application can be seen at Genoa's Costa Aquarium. This media system focuses on simplicity, low level intrusiveness, support for natural interaction, and current-state visibility. The interface's basic element is a "multimedia card" that corresponds to each presentation subject, such as a particular fish or a fish tank containing several fish species. Each multimedia card provides users with content and touch-screen buttons that allow them to control content presentation and navigate between tanks (previous/next, since the visiting path is sequential)[Bellotti et al., 2002].

The PEACH project [PEACH, 2005] (Personal Experience with Active Cultural Heritage) is another example of a PDA-based application. Zancanaro et al. [2003] have applied the idea of using cinematographic techniques for presenting details of artworks in a multimedia guide prototype, which aims at providing the visitor with a personalized experience. The evaluation of an initial multimedia guide [Alfaro et al., 2004] showed that many users would have liked to control the length of presentation. In a later guide prototype [Rocchi et al., 2004], the focus was on automatically produced video clips played on the mobile device, using a life-like figure either as an anchorman or as a presenter that accompanies the visitor throughout the visit. Additional prototypes focused on providing easy-to-use interfaces that allows users to signal their interest in the topic being presented and support better personalization of the presentation delivered [Goren-Bar et al., 2005].

Interactive multimedia constitutes a promising communication tool for cultural heritage attractions and for museums that can thereby complement existing interpretative techniques. They are excellent interpreters, since they add visual aspects to the textual and audio material. They can communicate large amounts of often complex information in a user-friendly and interesting way, whilst allowing visitors to access the information they require at their own pace [Alison and Gwaltney, 1991]. However, interactive multimedia exhibits should not replace traditional interpretation methods, but rather complement them, and should assist the museum visitor by placing exhibits and artifacts in their historical and cultural context. One of the main challenges is how to design a multimedia presentation in such a way that it will convey the information to the visitors, thus enriching the visit experience, without distracting their attention from the exhibits themselves. The process of presentation preparation is thus rendered more complex.

The preparation of presentations for such multimedia guides has not yet been widely discussed. This paper presents a methodological approach for multimedia presentation preparation, addressing the above-mentioned

challenges, which was developed in the PIL (**P**EACH, **I**srae**l**) project [PIL, 2006], based on and combined with experience gained in the PEACH project.

Presentations preparation

The following sections suggest guidelines for preparation of multimedia presentations that will enrich and complement the visitors' experience without taking the place of the exhibits themselves. They are illustrated by examples taken from two exhibitions at the Hecht Museum (http://mushecht.haifa.ac.il/), for which multimedia presentations are prepared: 'The Ma῾agan Mikhael Ship, The Recovery of a 2400-year-old Merchantman Wreck' (hereafter: the ship exhibition, see Figure 1), and 'Phoenicians on the Northern Coast of Israel in the Biblical Period' (hereafter: the Phoenicians exhibition, see Figure 2).

Figure 1: The Ma'agan Michael Ship   Figure 2: The Phoenicians Exhibition

Nine steps were identified in the process of preparing presentations, as presented in Table 1 and detailed later on in the course of the paper.

Step	Description
1	Deciding on/finding the main idea of the exhibition
2	Recording exhibits
3	Defining fields of interest (perspectives)
4	Searching and selecting source text
5	Writing text (spoken language)
6	Choosing images
7	Selection of cinematographic techniques
8	Audio generation
9	Synchronizing audio and images

Table 1. Steps in the process of multimedia presentation preparation

Finding out the Main Idea of the Exhibition

Exhibitions usually have a concept or a "Main idea" which should clarify, limit, and focus their nature and scope. All stages of presentation preparation should follow this main idea, as suggested by Serrell [1996]. The multimedia guide must directly reflect the exhibition's "main idea", whether it summarizes or emphasizes certain aspects of it, by indicating angles of approach or aspects that the presentation emphasizes [Lamarche, 1995; McLean, 1996]. The "Main idea" in the case of the ship exhibition is the study of ancient ship technology and maritime history and archaeology [Vortruba, 2004]. The "Main idea" in the case of the Phoenicians exhibition is to provide a picture of the material culture of the Phoenicians as it emerges from the excavations in the northern coast of Israel [Raban and Stieglitz, 1993].

Recording Exhibits

Listing of the exhibits is not merely a technical step, but should also include some analysis about the exhibits themselves and about their contribution to the overall exhibition's "Main idea," which should be addressed and maintained during presentation preparation. This analysis is important to the visitor's understanding and active participation in a coherent path through the exhibition.

In the Ma'agan Michael ship exhibition, most of the exhibits are single objects and there are some glass-fronted display cabinets in which specimens and small objects are grouped (for illustration, see Figure 3). In the Phoenicians exhibition there are sections of display according to subjects. In each section, presented as an island, there are several glass-fronted display cabinets with small objects in them. The islands are referred to as themes (for illustration, see Figure 4) and in each theme there are several objects [Kashtan, 1996].
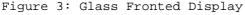

Figure 3: Glass Fronted Display

Figure 4: Imported Pottery Theme

Defining fields of interest

In order to define the scope of the presentations to be prepared, possible questions that a visitor might ask regarding the specific objects need to be listed. This process allows a comprehensive selection of possible answers to be planned to satisfy a wide range of visitors. The questions can be

categorized into more abstract perspectives, which are actually general views that can be applied to the presentation of the objects in the exhibition. The process is inductive: beginning with the specific objects, listing the questions, and then extracting the relevant perspectives. The perspectives' definition helps define coherent sets of presentations that can be linked and related one to the other when delivered, as suggested by Serrell [1996].

Following the "main ideas" of the exhibitions, in the ship exhibition the perspectives are more scientifically oriented: technologies, maritime archaeology, and conservation; in the Phoenicians exhibition the perspectives are more culture-oriented, emphasizing anthropological significance, the objects' uses, and ethnic influences.

As an example we can consider the Amphorae exhibit. Considering the technological perspective, the visitors' questions may be: How was the object manufactured? Using what materials? (Table 2 presents the rationale for the presentation).

Searching and Selecting the Source Text

When the list of presentations for the multimedia guide is ready, it is time to collect the relevant material. Since each presentation includes a question to answer, the writer of the texts has to review the literature in order to answer that question. In the Phoenicians exhibition case, the relevant information for each presentation was extracted from various sources such as [Tresman, 2004; Black, 2003; Moscati, 1988] and [Raban and Stieglitz, 1993].

#	Spoken Commentary	Visual Part (how)	Communicative Goals (why)
1	Amphora is a pottery vessel that was used for sea trade in ancient times.	Picture of the object	The visitor will focus on listening to the introduction
2	Pottery vessels are quite heavy and breakable. But, the main reason for using pottery is that there is no chemical reaction, between the pottery, and the products that are put in them.	A close-up on the pottery of one of the amphorae in the model.	Focus the look and thought on the material-pottery.
3	Amphorae were made on a potter's wheel, as explained in the nearby exhibition, called ancient crafts and industries.	Fade in the entrance to the exhibition.	Help the visitor find the mentioned exhibition
4	The shape of the Amphora was designed for maritime trade. Its handles are planned to be carried by a porter, holding one amphora in each hand.	Fade in an amphora in the model. Highlight the handles.	Visualize the details described by the audio.
5	The form of the handles, made it possible also, to secure the amphorae with ropes after loading. And in that way, to avoid possible break of the amphorae.	Highlight the ropes	Visualize the audio.
6	Finally, its conical base, allows placing the amphora in a specially designed space in the ship.	Highlight the base.	Visualize the audio.
7	Because of its characters, many Mediterranean peoples, used amphorae for maritime trade.	Fade in the object	The visitor will focus on listening to the closing

Table 2. The Rational for the Preparation of a Specific Presentation

Writing Text

The literature on the subject of guidelines for spoken commentary for mobile guides, both audio and multimedia, is sparse. Ideas for the guidelines presented here are drawn from Serrell's guidelines for written interpretative labels for museum exhibitions, with the supplements and changes made necessary by the visual and audio aspects of a multimedia guide. The presentation text should be a closed paragraph. It has to contain elements specific to the object and the chosen perspective, together with informative and descriptive material. The structure of such a paragraph should satisfy the needs of argumentative texts. It encapsulates the main argumentation of the idea being developed. This idea should appear in the first sentence, as its subject, and imposes a logical order on subsequent sentences that is readily recognizable. Another important point to remember is to place the key

words at the beginning of the phrase, thus facilitating the visitor's retention of the message in his/her memory [Baños, 1995; Serrell, 1996].

If there is no predetermined order for the presentation, one of the most basic guidelines is that each unit of information must be complete and independent [Baños, 1995; Lamarche, 1995]. In the case of the PIL project, a presentation constitutes just such a unit of information of this kind. The spoken commentary section of Table 2 presents an example of spoken text generated for a presentation discussing Phoenician amphorae.

The title/label

The titles of the presentations, which in the case of a multimedia guide are the buttons that the visitor have to press in order to see the presentation, must be evocative, meaning that the link between the title and the content of the presentations must be obvious. They should also be impelling in order to raise interest and encourage the visitor to choose and view the presentation. Finally, their length should be of two to six words (like the titles of the written labels) [Baños, 1995]. In the PIL project, the perspectives were kept as presentation titles, to enable the visitors to follow (or change) their perspectives of interest.

The content

Multimedia presentations should be referred to as interpretative texts, and therefore should tell stories in a narrative form. Their purpose is to contribute to the over-all visitor experience in a positive, enlightening, provocative, and meaningful way (like interpretative labels). They address the visitors' unspoken concerns: What's in it for me? Why should I care? How will knowing this fact improve my life? [Decrosse and Natali, 1995; Serrell, 1996].

The content of the presentations must be condensed, yet understandable by the greatest possible number of visitors whose interest the museum wishes to capture. It must be clear, so that it will be easily understood, rendering it potentially interesting and easier to retain in the memory [Baños, 1995].

In the case of the PIL project there is another kind of presentation: the "general" presentation. Such presentations provide an overview of every perspective or theme in both the ship and Phoenicians exhibitions. The structure of these presentations should be different, since their purpose is to enumerate particular points in the main idea. They should be structured as an open paragraph, satisfying the utilitarian criteria inherent in text intended for the general public, rather than the logical narrative organization criteria. The general presentations should appear in a fragmented form, in which line breaks are used without any set pattern [Baños, 1995].

The language

One of the main constraints on multimedia text preparation, such as exhibition text writing, is that the message must be understood by as many people as possible. It is thus essential to use a simple, but not simplistic, writing style in order to reach the visitors regardless of their level of knowledge, and to involve only those concepts that the visitors need in order to understand the overall message [Baños, 1995; Decrosse and Natali, 1995].

It is the writer's task to familiarize visitors with the appropriate terminology and the concepts to which it refers. Accordingly, all relatively specialized terms should be followed by a brief explanation so that the

visitors can fully understand them. Co-occurring expressions offer a degree of predictability in a text. The more predictable words there are in a sentence, the more easily it will be retained by the visitor. In this way the educational goal of the exhibition will still be achieved: visitors will have access to condensed information. They will also have an opportunity to broaden their vocabulary by being exposed to new words and their meaning. [Baños, 1995].

It is possible, for that matter, to use the so-called BASIC (British American Scientific International Commercial) English. The aim of Basic English is to serve as an international second language for general communication, commerce and science [Ogden, 1934]. Since the visitors to museums come from varied backgrounds (in terms of both language and profession), it seems to make sense to use this simplified language for exhibition text. It is important to note, that the application of the Basic English, must be done with care: the texts must preserve their scientific features.

In the case of the Hecht Museum, Basic English is especially relevant, mainly because the presentations are to be played in English, albeit Hebrew is the mother tongue of most of its visitors, and English merely their second language. Since the text in this case is intended to be heard and not read, its writing must be more sound- than visual-oriented (it must be clear and also euphonious). If the text for the multimedia guide is taken out of the catalog of the exhibition or from professional articles, it should be properly revised, translated if necessary, and annotated with indications of the pronunciation of foreign names or terms. Affirmative turns of phrase such as "that is why" and "thus", which favor predicative statements, should be used [Baños, 1995; Lamarche, 1995].

These recommendations are followed in our work, as illustrated by Table 2.

The length of a presentation

Text should be constructed in paragraphs of three or four sentences, each of which contains not more than sixteen words. Condensing the text is necessary and consists in eliminating redundancy or unnecessary repetition, thus retaining a minimum number of words in order to enhance readability. In this way, the visitor is brought directly into contact with the essence of the message [Baños, 1995].

Visitors' short-term memory can retain between 8-16 words and all visitors have a longer short-term memory capacity (16%) for what they hear than for what they read, regardless of how fast they read [Baños, 1995]. Since multimedia guide text is heard and not read, it is preferable to use short sentences and avoid departures from normal word order and nested subordinate clauses [Lamarche, 1995].

In Table 2, it can be seen that these recommendations are followed.

Physical location

Information is most affectively retained if the structure of its presentation is cohesive and appropriate to the physical location of the visitor, as well as of the objects within the museum environment. This may be accomplished by using comparisons and references to space and time, which in turn may help the visitor being oriented within the museum as well as across the various objects [Alfaro et al., 2004; Zancanaro et al., 2003].

The PIL museum visitors' guide is context-aware; hence presentations are delivered to the visitor in the right place to begin with.
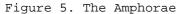

Figure 5. The Amphorae

Figure 6. The Picture on the Guide

Choosing Images

The next step, after the texts for the presentations have been written, is to choose the "right" picture for each sentence. Since each sentence has a part in the story which is told in the presentation (opening, supportive/ contradictive argument, closing) the image should complete and support this part. The possibilities of pictures that can be put in the guide are endless, among them: a picture of the exhibit in the museum (see Figure 6 as an example of an exhibit, taken out of Figure 5, in which the actual area of the exhibit is shown); a close-up of a detail in the object (see Figure 7); a parallel exhibit from a different period or culture (which is presented in the museum); an image of the object before it was retrieved from under the water; over-composing of measurements and information, as illustrated in the case of the Amphorae, where the figure supports the text (see Sections 4 and 5 of Table 2 and Figure 8); and so on. The purpose of the images in particular and of the visual element in general is to support the verbal element and to highlight significant points that are inaccessible to the visitor, without diverting the visitor's attention from the actual exhibits [Zancanaro et al., 2003].

Selecting Cinematographic Techniques

Once the text has been written and the pictures chosen, the actual preparation of the presentation can begin. The sequence of pictures should be synchronized with the audio commentary and the transitions among them are planned according to cinematographic techniques. The cinematographic techniques are also used for highlighting details in the images and for over imposing professional and technical terms. The language of cinematography [Metz, 1974], including shot segmentation, camera movements, and transition effects, is the basic resource for planning the animation and synchronizing the visual and the verbal elements of the presentation.

Figure 7. Zooming in   Figure 8. Marking points of interest

The verbal element always drives the visual one. Therefore after choosing the right image for each sentence, a decision must be made regarding which cinematographic technique should be used, in order to make the connection between the images as comfortable and smooth as possible. The use of this type of animation allows the visitor to identify better the details introduced by the audio counterpart of the presentation [Nielsen, 1994].

In order to create a more engaging presentation, the visual element should not only focus on the right detail at the right time, but also support the presentation of new audio information by illustrating its relation to information that has already been given. In this way, continuity between the information is forged, which in turn facilitates the viewing of the presentation while stimulating the user's absorption of new information. For example, two shots of the same image can be just one long shot of the same image, but when linked by a long cross fade, the user understands that background information is about to be provided [Zancanaro et al., 2003].

In the ship exhibition, the cinematographic techniques broadly support two main tasks of the multimedia guide: helping the visitor to locate the described details of the object (e.g. via zoom-in effect), and combining information which is relevant to the exhibition but either not presented or hidden (fade effects). In the Phoenicians exhibition, the cinematographic techniques help visitors to orient and easily find the right object within glass-fronted display cabinet in front of them (see Figure 4 as an illustration of this requirement).

Audio Generation

After the text is ready, comes the turn of audio preparation. Speech generation is an economically viable possibility yet it could be not appealing to the visitor. In this case careful attention should be given to the selection of the reader or the voice synthesis tool. Human vice recorded by a professional actor is indeed recommended for a multimedia guide [Decrosse and Natali, 1995].

Male or female voice? There is no certain answer to this question, it seems that men prefer a male voice and women prefer a female one [Lee, Nass and

Brave, 2000]. Lamarche [1995] noted that it is important to be aware of stereotypes: a man's voice is not necessarily more authoritarian, nor a woman's voice more seductive; it is the quality of the reading that really matters.

Given the research nature of the PIL project a voice synthesizer was used, even if it is noticeably inferior to human voice.

Synchronization of Audio and Images

The final step is generating the complete presentation by aligning the spoken text with the images, and applying the selected cinematographic techniques.

Preparing for Personalization and Adaptation

Personalization is the way in which a system can alter its output according to the characteristics of the specific user. Personalization may include also contextualization and dynamic adaptation. For basic personalization, we take into account the fact that each visitor in the museum may have different knowledge, goals, attitudes, etc., and so, in general, presentations should favor the dimensions that are more important for him/her. Contextualization takes into account the current situation in which the presentation is to take place. Dynamic adaptation of the presentation may take into account any element that has emerged so far during the visit and the sequence of presentations, and in particular can be based on a dynamic user model inferred from user's behavior and explicit input to the system.

There are several ways to personalize a guide; however, there are two features strictly related to the content: coherence and cohesion. A discourse is coherent if it relates to each visitor as if the content were prepared for him/her. In fact, we have to respect two types of coherence: the first relates to the exhibition's main idea, and the other to the preferences of each specific visitor.

In order to be used by a system which will accommodate personalization, the segments of information have to be retrievable and adapted, or they must be represented in an internal format which is then used by a program that dynamically produces the message. If we consider only the former case, the segments need to be combined by the system, and must be authored taking this aspect into account.

The second feature, cohesion, relates to the way information is presented. Two related items can be presented in a 'context-free' way, such as: 'This is x …' and 'this is y'. A more cohesive way would exploit linguistic tools such as comparisons (e.g. 'as you have seen before in x …') or suggestions (e.g. 'as you will see in front of x …'). The use of such linguistic cues can help the visitor to consider her/his visit as a discourse, which unfolds as s/he approaches each new item, which is presented according to the current context (item visited previously, preferences indicated during the visit, position, etc.).

To make all this possible, authors should provide many alternatives. For example, they should generate many presentations with the same visual element, but slightly different audio elements, usually alternatives ways of presenting the same content [Rocchi, Zancanaro 2005]. Thus the system is enabled to perform personalization that, together with multimedia, can help the visitor get engaged in the visit and feel supported or accompanied through the exhibition [Graziola et al. 2005].

Conclusions and Future Work

Preparation of information for museum visitors using multimedia is becoming a non trivial task. It involves finding the "Main idea" of the planned set of presentations, and defining a set of possible areas of interest. After initial planning, appropriate material as a source for the presentations has to be searched. This material in turn has to be converted to appropriate spoken text (Audio), integrated with images whilst applying cinematographic techniques to support the presentation's specific goal. Personalization can be addressed by generating alternative presentations (or presentation segments) that can be combined to form a coherent sequence of presentations supporting the individual visitor's interests and visiting path. This paper proposes a structured, general methodology for multimedia presentation preparation for cultural heritage sites. It applies ideas based on experience gained on several projects where multimedia presentations for museum visitors' guide system were prepared.

Future work will include evaluation of the contribution of the multimedia presentation to the museum experience.

Acknowledgements

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