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PERSONALIZATION THROUGH IT IN MUSEUMS. DOES IT REALLY WORK? THE CASE OF THE MARBLE MUSEUM WEBSITE

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Abstract

In the past few years, personalization through IT has become a significant trend in the museum world, where more and more institutions are introducing it to complement their collections and to better reach out to their visitors. Despite this progressive success and the consequent implementation of personalization techniques in museums all over the world, very little has been written on the potential of this approach for this specific sector. This is why it appears necessary and timely to address this topic in an article that would provide examples of the most interesting on line and on site applications as well as an in depth analysis of the different techniques most frequently used. Particular attention will be devoted to the evaluation of a specific case study, that of the Carrara Marble Museum's website, which offers a unique example of personalized access to the collection following three different techniques. Thanks to this evaluation, which has been carried out through usability testing and a limited number of questionnaires, it will be possible to draw some important conclusions on the effectiveness of this approach in the specific context of online museum applications.

Keywords: museums, personalization techniques, segmentation, adaptivity, adaptability, marble museum's website, evaluation

HOW CAN PERSONALIZATION BE ACHIEVED?

In the past few years, personalization through IT has become a significant trend in our market society and therefore more and more companies throughout different financial and economic sectors have been resorting to it as a means of building customer loyalty (e.g. Amazon, Dell, etc.). However, the necessity to provide differentiated access to information and services according to the "user" specific profile is not only limited to the business world. Personalization has become very popular also in the cultural sector and particularly in museums, where, as a result of a redefinition process that has been taking place in the past few decades, it has been progressively introduced to respond to museums' educational, marketing as well as usability needs [1]. Beyond the common goal, there is a great diversity in how personalization through IT can be achieved. The

efforts described below are completed or on going initiatives to provide evidence of the different techniques available and of the use that some museums all over the world make of these approaches both on site (audio-guides, interactive kiosks) and on line (website).

Customisation or adaptability

A first important distinction needs to be made between customisation and personalization, between adaptive and adaptable systems. Customisation or Adaptability occurs "when the user can configure an interface and create a profile manually, adding and removing elements"[2]. Once the parameters are set, the system adapts its behaviour accordingly. Examples of adaptable applications such as customisable calendars (Metropolitan Museum) or customised alert systems (Musée du Louvre's new website, available from September 2004) are commonly available on museums' websites. The principle is very simple. Instead of providing everybody with the standard information about the museum's activities, the virtual visitor can set his/her profile by defining his/her personal interests. Whenever an exhibition, a conference or another event of interest are scheduled, the information on the personal calendar will be automatically updated and an e-mail or an SMS will be sent to the user to inform him/her about it (alert). Customised visitors plans are also inspired by the same principle. Upon filling in a profile, where the future visitor has to indicate how and when s/he is planning to come, with whom and how long s/he is planning to stay, what sort of interest s/he has and which languages s/he speaks, the system will be able to provide a customised plan for the visit that takes into consideration the variables indicated. Customised museum plans can be very useful especially for those museums like the Louvre, which will introduce it on its new website, where visitors are very often overwhelmed by the amount of objects to see and therefore spend too much time after arriving to figure out what they want to see.

Customisation or adaptability offers interesting perspective also on site, mainly with audio guides like the Personal Digital museums assistant (PDMA) of the Tokyo university museum, which allows the personnel to set the specific parameters related to the visitor when the PDA is lent out. This may include aspects such as the language used, the size of the font, the degree of specialised knowledge (expert, intermediate, neophyte) or the type

of user (adult versus child). If the same visitor visits the museum again later, it is possible to have the PDMA set automatically back to the customised profile within the database, and suggest a better way for the visitors to view exhibits based upon their behaviours during the previous visits.

Personalisation or adaptivity

The above-mentioned kind of individualization gives control to the user, who decides the terms of the adaptation and when to employ it. On the contrary, in personalisation or adaptivity it is the system which changes its own characteristics automatically according to the user's needs. Modification of interface presentation or system behaviour depends, in fact, on the way the user interacts with the system and how the user navigates in the physical and virtual space. What makes this technology so exceptional is that little effort is required on the part of the user because individual profiles are automatically built based on normal use. The more the visitor uses the system, the more the profile grows and refines, continually adjusting their preferences (cf. figure 1)

[Fig 1: A scheme representing the functioning of an adaptive system]

By providing such coherent and contextualized information, modelled on the user interaction with the exhibition space as well as with the system itself, adaptive systems

have enormous potentialities in the museum context. However, because of the complexity attached to developing such systems (in comparison with more traditional approaches), almost only prototypes have been thus far developed.

One of the first examples of adaptive application in a museum context was the ILEX (Intelligent Labelling Explorer) project, developed between 1996 and 1997 by the University of Edinburgh in co-operation with the National Museum of Scotland, with the aim of providing "intelligent labels" for the description of the jewel collection available on the museum website [4]. By using natural language generation techniques, the ILEX prototype provides descriptions of museum artefacts that take into consideration both the level of knowledge of the user and the history of the interaction. Web pages for each object in the museum's collection are generated as the visitor navigates around the system's website. These descriptions are virtual; they do not exist in any form prior to the user's request, but are created on the fly by the system, and adapted to the individual user's needs and behaviours. Thanks to mobile devices, these sorts of personalized descriptions can be also made available to the visitor in the gallery and further integrated with the presentation of visual images or hyperlinks. HyperAudio [5] , HIPS [6] and its spin-off HIPPIE are examples of this type of applications. These hand-held electronic prototypes, developed respectively by IRST's Cognitive and Communication technology division in Trento for the Museum of Rovereto, by a consortium of partners for Siena's Museo Civico and by GMD for the art collection of the Castle of Birlinghoven, provide visitors of museums with contextual and personalized information. This is mainly possible thanks to the creation of a user model which automatically evaluates the user's interaction with the system (types of information s/he selects, presentation modalities s/he prefers, presentation s/he interrupts, etc.) and the user's navigation in the museum space (what s/he has seen, how long s/he has stop in front of certain objects, etc.). The user model is exploited during the process of content generation in order to avoid repetition and false implications, and to promote other objects or paths potentially relevant from the user's point of view. Based on a similar, but less complex approach, is Museum Wearable, developed by Flavia Sparacino for the MIT museum [7]. This wearable museum guide evaluates the visitor's preferences by observing their path and length of stops along the museum exhibit space and selects content from a large database of available movie clips, audio, and animations, which integrate the museum experience into a coherent whole.

Segmentation

Another useful personalisation technique is segmentation, which, unlike adaptivity and adaptability, is based on identification of clusters of the population interacting with the system rather than on individual user behaviour or user input [2]. In fact, when the needs, preferences and the behavioural attributes of sub-communities of users are well defined and relatively homogeneous, content can be easily personalized on the basis of one or more of those categories, rather than tailor made to each individual. This approach would give tailored content without explicitly building the one to one relationship that requires gathering knowledge about individuals. In this particular case, target groups must be determined, as well as the content appropriate for those groups. Some of the different criteria for grouping are the educational level, the age group, the learning style, the users' goals, etc. By applying one category or a combination of these criteria the profile of a typical group member is therefore created.

One might object that segmentation is not a proper form of personalisation, because it does not refer to the behaviour or needs of a single person but rather represents a group acting as an individual. Indeed differences among group members do exist. However, in particular groups, such as museum visitors, individuals do not dramatically differ from the profiles of the groups with which they are associated and therefore can be successfully served by using segmentation. Examples of this technique can be found on some museums' websites, where dedicated spaces are allocated to different categories of users, the most common being, children, disabled people and professionals/experts. Each dedicated space provides all the tools that are necessary to the users of a specific category to find the information needed at the level of details desired. A similar approach has been implemented in audio-guides, where visitors can choose among a set of profiles such as "child", "family" or "adult".

PERSONALIZATION: DOES IT REALLY WORK?

In the previous sections, we have seen how personalization techniques can be easily applied to virtual or on-site museum applications with the potential of providing efficient access to information and therefore helping visitors to learn and enjoy themselves more. However, a question still needs to be answered: Does personalization really improve the visitor's experience in the terms envisaged by its promoters?

To help us find an answer to this question, we will refer to a particular evaluation that was carried out on the Carrara Marble Museum website, which offers, alongside more traditional applications, a unique example of personalised access to the collection following all three previously mentioned techniques. This particular feature makes it, therefore, the perfect case study for an investigation which aims at drawing the first important conclusions on the effectiveness of the implementation of personalisation techniques in the museum context. Before analysing in detail the results of this evaluation, a brief description will be provided of the way in which the three techniques are exploited here (for a more comprehensive analysis of the application, please refer to [8]).

The personalizing features of the marble museum's website

Unlike other museums' websites which privilege more traditional ways of access to the collection, the marble museum offers an alternative approach. Instead of confronting visitors directly with a search by engine, department or map, the developers implemented here an example of segmentation technique by proposing an access by type of user (cf. figure 2)

[Fig 2: User profile selection on the Marble Museum website, http://giove.cnuce.cnr.it/Museo.html]

Based on an accurate study of the museum's traditional visitors as well as of the possible activities that such visitors might want to perform when accessing the on-line collection, the National Research Council, which developed the site in cooperation with the museum, decided to group the possible users into three categories: tourists, art students and experts. According to the model defined by the developers, each user type is defined by two different characteristics: the level of detail and the mode of access to the information. The expert, for example, who is supposedly well aware of what he is looking for, can navigate the collection through a search engine and has access to detailed descriptions, complete with bibliographic information about materials and authors. On the other hand, the tourist profile is characterised by the need for general information, expressed and presented clearly through spatial representation (interactive maps), that can help the users to orient themselves in the physical as well as virtual space. The art student category represents an intermediate profile, defined especially for users with a limited background, a need for detailed information and moderate support during navigation (while the expert can specify directly his request by typing in the name in the fields available, the student's search engine is supported by an accompanying list of material, periods and artists). Once the choice among the three profiles is made, the virtual visitor can then navigate the information space concerning the museum's collection in accordance to the level of detail and the access to the information related to the selected category [8]. Moreover, for all those who do not associate themselves with any of the previously mentioned types, the application offers a fourth user-defined/customisable option that enables the visitors to set

up their own profile by defining manually the type of access to the collection (map, lists or search engine), the type of information (bibliography, dimensions, location, history of ownership, etc.) and the layout desired. Once the profile is manually defined by the user all access to the collection will be provided according to the parameters set. It is important to note that at any time the user can change the current profile and select one of the other three by clicking on the scrollbar available at the bottom of each page [8].

Besides segmentation and adaptability, the application proposes a third example of personalisation technique, namely adaptivity, which is implemented at the level of the virtual guide, accompanying the user during his/her navigation through the collection. When the agent associated with the virtual guide is activated by the user on the main page of the collection section, an extra window, dedicated to the comments of the virtual guide, appears besides the presentation of a work of art (cf. figure 3)

[Fig 3: The marble museum's virtual guide, http://giove.cnuce.cnr.it/Museo.html]

This virtual guide, which offers extra information with the aim of making the user visit more interesting and pleasant, is very similar to a real museum guide and just like one of them, it is able to automatically adapt the content of its comments, by taking into

consideration not only the profile of the visitor but also the works of art, the artists, the materials and the techniques previously seen. The adaptive information that is dynamically generated refers to 5 different categories of content: introductory, summative, comparative, dissimilar, and peculiar. In particular each profile is associated with some type of information that is considered interesting for the corresponding user [9]. Table 1 summarizes when adaptive information is triggered and how the criteria considered have been tailored for the different users profile.

	TOURIST	STUDENT	EXPERT
INTRODUCTORY	New room	New definition	New material
SUMMATIVE	Every 5 accesses (grouped by room)	Every 10 accesses (grouped by definition)	Every 15 accesses (grouped by historical period)
COMPARATIVE	Artist, Material, General Chronology	Definition, artist, precise chronology	Dimensions, artist, precise chronology
DISSIMILAR	New material	New definition	Specific transition
CURIOSITY	Unique artist	Unique definition	Observations by other experts

Table 1: A scheme representing the relevant aspects considered for adaptive support for each user profile [8]

The evaluation

After this brief description of the website's personalising features, we can now focus on analysing in detail the results of the evaluation that was carried out by the National Research Centre in order to test the usability of the system. During the evaluation, forty users, aged between 20 and 53, were asked to navigate the application freely for at least 30 minutes (half of the time with and half of the time without adaptive support) and to fill in a questionnaire. Even if the questionnaire focussed primarily on the efficiency of the adaptive virtual guide, it provided also very useful information concerning the other personalisation features. In particular, the first 15 questions, which refer more generally to interface, navigation and access issues, proved very helpful. As the evaluation was based on a think aloud technique, other useful information was provided by the recording of the comments and the patterns of behaviours of the users during interaction with the system.

Besides the obvious problems of navigation, content and design, which have surely influenced the overall judgement on the usability of the system, the evaluation has provided interesting results that were able to point out, together with the advantages, some of the design- and use-related disadvantages, associated with the three previously described personalisation techniques.

Segmentation

We have seen how, unlike more traditional applications, the marble museum website confronts users that want to access the collection, with a choice between three predefined and one user-defined profile (cf. figure 2). However, this type of approach did not seem to be very popular with the users. Some of them declared, in fact, to find it difficult to choose between one of the four profiles. Even if explanations as to why visitors did not feel comfortable with such choice are not provided, we can assume that complications might be due to the fact that the users had to take time to reflect upon themselves (what category do I belong to?) and eventually check out the meaning of the different profiles, before being able to make a decision. The time consuming effort involved as well as the

fact that some users did not feel comfortable with being categorized, has caused some of them to openly complain about this approach and to propose more traditional solutions. There is no doubt that the question of choice is one of the most common problems associated with this type of personalization technique. However, we cannot totally exclude the fact that the specific nature of the evaluation might have also played an important role in determining such uncertainty. In fact, we can presume that under normal circumstances of use, when users navigate with a specific purpose in mind, a smaller percentage of users encountering such difficulty might be recorded.

Choosing among the different profiles is not the only difficulty associated with this type of personalisation technique. Some users expressed also disappointment with the profile chosen, causing them to try out other possibilities before finding the one that suited them. In this respect it is interesting to look at the way users navigated the system, which was recorded by the evaluators during the test. Even if only 29 records are available, we can see how only a few users have confined themselves to maintaining one profile, while the majority tried out at least two or three. The reasons for such continuous changes are various. In some cases, the dissatisfaction with the chosen profile was due to the fact that the level of detail provided did not correspond to the user's expectations. This was particularly true in the case of the expert and student profiles, where more information was expected. Confusion was also created by the fact that the choices made by the visitors were mostly based on a purely intuitive interpretation of the meaning of the profiles which, in the end, did not correspond to the idea that the developers had in mind when implementing the system. This is why it is very important that developers create profiles that are easily and intuitively understandable by the users. Extra attention needs to be paid also to the words that are chosen to identify such profiles, as these can be destabilizing for the users. Let us take, for example, the case of the word tourist, which is associated here with one of the profiles. This word has often a negative connotation attached to it, at least in the cultural sector, and therefore we can presume that its use in this specific context might have pushed some of the users, who would be more appropriate for this category, to select another less suitable profile.

Adaptability

As far as adaptivity is concerned, the evaluation clearly pointed out that users had difficulties in either choosing or interacting with this type of personalisation (few people selected it and those who did were so dissatisfied that ended up opting for one of the three predefined profiles). Besides a very few cases in which the user did not understand the concept behind this feature (cf. comment: “Personalisation, what does it mean?”), the major obstacles encountered by visitors dealing with adaptability are the time and effort required to fill in profiles or set parameters. In fact, as we have underlined before, a system that restricts personalization to adaptation performed by the user, requires him or her to spend time and effort to carry out this task, to reflect on his or her interests and needs, by answering questions or filling in profiles. However, people are generally more motivated to start using things rather than to take the initial time to set up a lot of parameters. This problem is exacerbated on the web, where users are extremely impatient to get something useful out of a website. This is why it becomes very important that the advantages of customisation are made clear to the users from the beginning; otherwise, there is very little chance that the visitor will invest in such time-consuming activity. “Do ut des”, the Romans used to say, and it appears that this principle is still valid nowadays for this type of applications.

Adaptivity

The overall feedback concerning this form of personalisation seems to be reasonably positive. 94% of the users declared to have preferred the visit with the virtual guide, which was considered particularly useful because it accompanied the visitors through the collections just like a real museums guide and helped them to orient themselves, to better understand the visited works of art, to notice things that they would otherwise not see and to get extra information. When asked to evaluate the utility, the simplicity of use, the amusement value and the overall quality of the adaptive virtual guide on a scale from one to seven (one being the minimum and seven the maximum), the users expressed a satisfaction level near five, with the exception of the simplicity of use which was well above six. In particular, the users seemed to value summary information, which helped

them to organise and remember the path followed as well as to plan how to proceed. It also facilitated the access to some work previously visited, as they could be selected directly from the summary. Table number two shows how the other types of information provided by the virtual guide, namely comparison, difference, curiosity and introductory comments were also very much appreciated by the users[9].

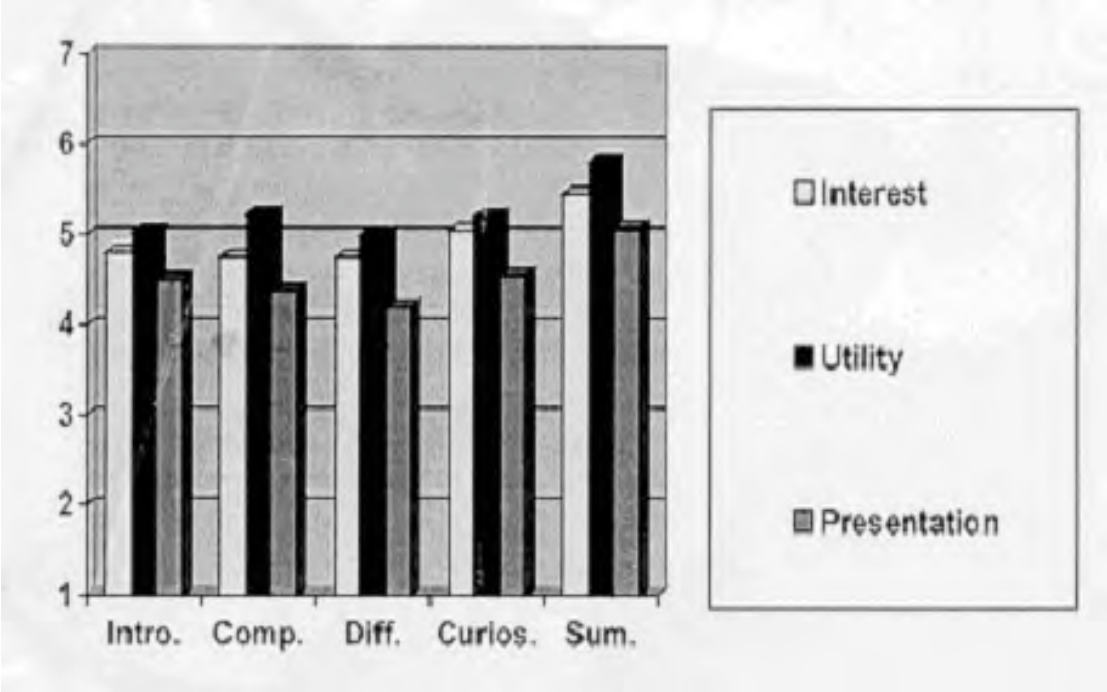

Table 2: A scheme representing the degree of user satisfaction with the information provided by the virtual guide [8]

These findings seem to confirm what other evaluations of adaptable museum applications such as the HIPS and Hyperaudio prototypes had already revealed [10]. Adaptive features are indeed very useful for the visitors because they help to create an immersive environment that makes it easier for the user to orient himself/herself, localize the object and stimulate the comparison with other items of interest, whilst reducing information overload. However, some drawbacks have also emerged. If we look at the survey, in particular at questions number eight and nine, which asked if the information provided by the virtual guide was suitable to their specific profile, we can see how almost half of the answers were negative. When asked which information was omitted, the users indicated that the virtual guide should offer more detailed descriptions, especially for those who had originally selected an expert or art student profile. Moreover some of the users also complained that the virtual guide was often repetitive and did not suggest relevant exhibits or adaptive tour proposals, based on previous visitors' behaviour or interests.

These problems, underlined by the user during the test, are indicators of the difficulties encountered by the developers in creating an effective user profile. Having the system adapt the information automatically to the user, assumes, in fact, that the computer can guess the user's needs through the creation of a very complex user model, defined by specific rules. Building a user model that matches the requirements and characteristics or fits potential users in the virtual or real museum space is therefore of fundamental importance for the quality of adaptive applications. However, this is strictly dependent on the developer's ability to understand users' characteristics and contexts of use and of translating such properties into a set of rules. But unfortunately sometimes even excellent developers can find this extremely problematic, as the specific case of the marble museum's virtual guide seems to prove. Here for example the developers should have clearly differentiated the amount of detail provided per type of user and should have pushed personalisation even further by creating a complex user model, that could satisfy the visitors' specific need for adaptive suggestions based on previous behavioural patters.

CONCLUSIONS

As we have seen at the beginning, personalization through IT has been introduced in museums mainly with the intention of being usable and useful for the visitors. However the results of this evaluation proved that this is not always an easy task to achieve, as many design- as well as use-related obstacles stand in the way of an effective and successful implementation. But, if this is the case, is the implementation of personalisation techniques worth the effort for museums? Ultimately it might not be the case. However, I am personally convinced that there is a way for museums as well as other cultural institutions to take advantages of the benefits brought about by the introduction of personalization techniques, while minimizing the above mentioned inconveniences. As the guru of usability, Jacob Nielsen himself admits at a certain point in his critique [11], personalization might indeed work in certain cases and if certain conditions are met, such as: reducing the amount of extra work on the user, stating clearly what the benefits for the user might be in exchange for investing time into customisation ("do ut des"), creating systems or user models that are simple to describe in machine-

understandable ways and developing applications related to relatively unchangeable situation, where the behaviour of the user can be easily predictable.

Far from being the final wordson personalization in museums, these suggestions might be very useful to help developers in their attempt to use personalization techniques for museological applications. Further studies are necessary not only to increase our understanding of the potential of personalization through IT in museums but also to better define which applications and techniques are more likely to succeed in this specific context. This is precisely the objective of my research for the coming years.

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