

# A New Approach for the Creation of a Non-Profit Website with the Example of a Regional Museum\*

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*Abstract:* - In the engineering of Internet applications the main demand is to concentrate on interests of the user. That means that the user is predetermined. In this paper, a new approach is proposed for the case when the stakeholder is not a user and the final user is not sharply defined. This situation is typical for design of a website for a non-profit rural regional museum. The first stages in this case consist of; the creation the user's model for the regional museum's website; the study of characteristics of existing successful regional museum sites, the creation of a quick prototype of the site taking into account characteristic features of successful sites; the use of the prototype for monitoring the users' behavior and organizing direct feedback with them. In this article basic elements of these new first stages are considered and shown by example in the creation of a prototype website for future sites for regional museums in the southeast region of Mexico.

*Key words:* regional museum websites, user profiles, access monitoring, sample of successful websites.

## 1 Introduction

The task of this investigation was born in the process of creation of a website for a regional museum in the southeast part of Mexico. We set out to use the technology of design and development of Internet applications in this process. One of the main features of the mainstream in Internet applications' design is User Centered Design (UCD), which enables developers to focus on the users as the heart of the design process [1]. Therefore, the user is set in advance. This situation can appear when the future user is specified by the financier (stakeholder) of the website or when it is obvious. For example, it is practically obvious that the users of a school website can be pupils, teachers, parents and graduates.

So there are specific challenges for non-profit regional museums Websites' design:

- The stakeholder who pays for the creation of the site is not the final user.
- The user is not the purchaser of the final product.
- The stakeholder pays money but does not have any special demands on Website's content.
- For the first step there is not any "user" of non-profit regional museum Website.

- In case of a museum site users can be the people looking the information on regional features of culture, nature, economy, histories, etc. Those can be scientists; pupils, or tourists, i.e. potential visitors of a virtual museum are those who can visit the real museum also.

However, this reasoning does not give exact instructions on a contingent, as it does not consider distinction in availability of a real and virtual museum to a different contingent of visitors. In the first case it is necessary to appear in the geographical neighborhood of the museum, in the second case it is necessary to have access to the Internet. For poor regions of a southwest of Mexico access to the Internet is an essential restriction of a circle of users. It is necessary to consider also, that the museum site is noncommercial (non-profit) that is why its visitors try to satisfy the interests different from those of visitors to a commercial site.

The financier of a noncommercial museum site's development is not interested in these details about a contingent of the site's visitors. As a result there is a situation in which the basic recommendation for developers of a site: to know and satisfy the interests of site's visitor's cannot be executed directly from the initial moment through some exchange of opinions with future final user. For the future user it

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is difficult to discuss the subjects that (s)he has not yet seen.

## 2 Formulation of the problem

This new approach therefore is offered for the first cycles of development of a regional museum site in the situation, which is outside of the standard technique.

The goal of this approach is to first create a quick prototype of the website that focuses on the future user. Perhaps the user does not always know what his expectations are for the website. Initially, it is necessary to guess what the user's needs are and propose some additional options that could fall under the special interest area of the site, enticing the user to receive and give more information to the site.

The creation of this prototype of a non-profit website requires a methodology that covers two principal aspects:

- On one hand it must consider the technical aspects and the content information taking into account the problems in the formalization of the final user models, methods and criteria for investigation, etc., considering existing websites in the Internet that are similar to the objectives of investigation.
- On the other hand the humanitarian aspect, involving the social technologies that provoke user participation and increase the motivation of those who participate in the design and maintenance of the site. The objects of the investigation are: similar sites, the prototype developed, and the user. This humanitarian aspect considers the use of active methods, for example user feedback, and passive methods such as the monitoring of the activities and characteristics of the user without the user's knowledge of such monitoring.

Each of these aspects predominates in a corresponding design and development stage:

- The first stage begins with the formation of a representative sample of successful non-profit websites and their most frequent parameters or attributes. Furthermore, methods for the measuring of these parameters (or at least some of them) should be developed. Then a cluster-analysis should be performed on this sample and the principal groups of these sites in a space of principal parameters (should be) revealed. The result of the analysis could be and was used to form recommendations for

the creation of an experimental website as a prototype of the final website and as a model for the creation of other similar sites. Thus reducing the amount of time required to create the other sites. This prototype must have a structure that can be filled, renovated with new materials within the limits of the defined structure, and expand the structure with new elements for interaction with the user.

- The second stage begins with the official opening of prototype on-line, using this prototype as a research tool and as a tool for dialog with the user. Once the site has been published, user monitoring, which is an implicit form of information exchange with the real user, can begin. Through this monitoring, the objects that generate the most interest can be identified, and user characteristics such as: location of the users, their habits in space and time, which days of the week they visit, traffic sources, and the characteristics of the equipment they use, among others. In this stage it is necessary to enrich the website with new forms of interchange or collaborations with the user and move from prototype to final product. In this case, the means of contact with the user should be established in the most direct and flexible form, located in the levels closest to the main page or directly on the main page.

## 3 Steps for Development of a quick prototype of a website for a regional museum

### 3.1 Hypothetical Final Users' Models

Advanced hypothesis about potential users of regional museums' Websites for the southeast part of Mexico were elaborated (See Table 1). These potential users are:

1. Specialists (experts) in the culture of the region,
2. Young people of the region,
3. Migrants to other regions and countries.

The third group of users is important because according to reference [2] in California and New York there are almost 440 thousand Mixtecs working. Meanwhile, in the nine districts of Oaxaca that this ethnic group inhabits, the population reaches 556 thousand two hundred and fifty. Which means the number of members of this ethnic group

who live in the United State represents 80% of those who live in Oaxaca.

There are specific challenges to receive users' feedback for Website development (especially for the last two types in the case of the southeast Mexico region):

- It may be difficult to get informed consent from some users,

- The users may not be able to communicate their thoughts, or even may be "incompetent" in a legal sense,
- Different users' groups may provide very conflicting requirements for an Internet application.

Table 1 Hypothetical characteristic of the principal types of users

| <div style="text-align: center;">TYPE</div> <div style="font-size: small;">Characteristic and design demands</div> | <b>Researchers or experts in the regional culture.</b>   | <b>Local children and youth</b>   | <b>Migrants to other regions and countries</b>   |
|--|--|---|--|
| <b>Motivation</b>  | The collection of specific scientific facts, documents, photographs, expert explanations, texts related to their area, new happenings in daily culture, historical documents, etc.   | Material for a first introduction to regional culture, materials from events where they can participate personally, materials for education and recreation, etc.  | News about daily life around the Mixtec region, components from their hometown such as recipes, local songs, photos of places they know, etc.  |
| <b>Frequency</b>   | In line with updates to the materials  | Depending on the frequency of updates of news and events.   | Regularly  |
| <b>Possible activities on the site and zones of interest on the site.</b>  | Search for special information in sub-pages including documents with a large amount of text.   | Search for information with more graphics and short texts of recent events (comics)   | Scan the entire site and then go back over their interest zones.   |
| <b>Design demands</b>  | Location of trustworthy documents in a friendly manner, regular updates, establishing means for organizing quick access to new material, providing tools for communication among users and between the users and the site designers. | Creation of information in a simple format with short texts including a lot of illustrations and images for well known situations, materials created especially for children and youth (games, contests, workshops, etc. with material pertaining to the Mixtec culture) in a form that captures attention, and providing tools of communication among users. | Inclusion of materials from well known places in the Mixtec region, publication of news of local and regional traditional events as quickly as possible according to the calendar of typical events (Guelaguetza—dance festival, regional fair, Day of the Dead, etc.) |

These user models are theoretical and are used as a base for future developments in the process of aligning the site to the real users. It has been considered that each of these user types require a special design for the web pages, pages focused on their needs, expectations and characteristics of their software and hardware. For this type of Website it is very important to focus on the users who show interest in the presence and development of the site.

It is necessary to take into consideration (do not forget) the “user of the first visit”. For this user it has to be clear from the looking through of the first pages that it is “his (her) site”, but there are not any special suggestions yet, only some additional attention to renewing meta-tag after statistic analysis of entering to site through the search engine.

### 3.2 Regional Museums’ Website Sampling and Set of Attributes Forming

The first stage of development of the website is based on the research of successful websites of regional museums in place of collaboration with the Stakeholder or main user of the future website. In our case, this stage consisted of the following activities:

- A collection of 180 websites of regional museums was obtained through three search engines, Google, Yahoo, and Yandex. These sites were in three languages; English, Spanish and Russian, and all were in the first thirty results of searches with the keywords “regional museum”, “museo regional”, and “krayevedcheski musei”.
- Among the 180 results of the searches, a group of 45 actual websites of regional museums were revealed (the others are not museums’ sites but only some mention about them or they were repeated in different search engines) and from this sample we obtained the most typical and abundant attributes of the sites such as:
  - “Closeness” of the structure of the analyzed site to the proposed site of “ideal structure”,
  - Number of principal colors used in the main page,
  - Number of tints of the principal colors,
  - Percentage of area covered with texts and images,
  - Font size of the main body of the first page text,
  - Presence of a logo and meta-tag,
  - Location in the search engine, etc.

The “closeness” is a characteristic for the structure of sites comparing what we consider as a root tree with the principal page accepted as a root, or as a node of the first level. For this measuring a special metric was created that in a general manner is similar to the Edit Tree Algorithm [3]. This metric consists of two terms:

- The first term is the amount of similar options (accounting for their synonyms and equivalent notions) between the two structures on the principal page (what the names of the buttons are).
- The second term is the sum:

$$\sum_k \min(h_{k,r}, h_{k,i}).$$

Here  $h_{k,r}$  and  $h_{k,i}$  numbers of hyperlinks in the option  $k$  for the real site (index  $r$ ) and the site of “ideal structure”(index  $i$ ) without accounting for the name and content of these nodes. The common term of the sum is the minimum of the nodes degrees in the second level of tree structure.

Balanced tree (B-tree) structures meet requirements to give “Two Click Access” form the principal page to final third page with searching material. And 12 options or mini-topics in every page to lower (third) level are sufficient and still possible to place in one screen (from the point of view video-ecology). So if the principal page is in the first (root) level then for this B-tree we can place in the third level 1728 mini topics (photos, pictures, short texts, etc.) with equal accessibility. We call this structure as “ideal structure” for the proposed site model.

A procedure for putting in order the sites from different search engines in concordance with level of their success in every search engine measured in a scale of preference (it is the last mentioned attribute—“Location in the search engine”) was also elaborated.

From the group of 45 sites with the above-mentioned attributes the “object (sites) - attribute matrix” was prepared.

### 3.3 Results of Clustering and Development of a quick prototype of a website for the regional museum

The object-attribute matrix represents the set of sites (vectors) in a space of attributes and vice versa. For clustering we use the principal components method [4, 5] with consecutive reducing of non-informative column vectors and row vectors.

In the result we received the matrix of 28 sites with 6 attributes, which organized in two principal components and gave the principal impact to

clusters formation. Other components can be neglected. The final attributes are: the number of principal colors used in the main page, 2) the font size of the main body of text, 3) "closeness" of the structure of the analyzed site to the proposed ideal site, 4) the number of tints of the principal colors, 5) the percentage of area covered with images, and 6) the percentage of area covered with texts.

In figure 1 you can see the groups of objects: 10 black objects and 18 gray objects. The objects in the first group are in the positive zone for factor 1 and the majority is concentrated in the area of positive or zero values in factor 2. The second group of objects has zero or negative values in factor 1 and is more widely distributed in factor 2. But the majority have negative values for factor 2. You can see that the objects which best represent opposites of factor 1 are Tomsk, which is the object closest to the X axis on the far right, and Newcastle, which is the object closest to the X axis and on the extreme left. For factor 2 the typical representatives are Mogilev and Amursk in the extreme positive and Rooms Province and Pioneertrails in the extreme negative.

Figure 2(a) shows that the sites on the opposite values for axis of factor (component) 1: Newcastle and Tomsk, have a correlation and anti-correlation correspondingly with factor 1. Figure 2(b) shows the same effect with factor (component) 2 with the opposite sites: Mogilev and Amursk which have a good correlation with the principal attributes of factor 2 (attributes 4, 5, 6) and show the anti-correlation for the sites Pioneertrails and Rooms province. The attributes 1, 2, 3 do not participate into the formation of factor 2 and for this reason the values of the objects in these attributes do not have much influence on the position of these sites in the space of factor 2. The principal components are characteristically most saturated if you compare the components on the vectors of the initial axes. Formula 1 can be established from the lineal combination of these parameters where the first three attributes form  $F_1$  and attributes 4, 5, and 6 form  $F_2$  as shown in the formulas (1) and the figures 2(a) and 2(b).

$$\left. \begin{aligned} F_1 &= -0.47 \times \text{Attr}_1 + 0.749 \times \text{Attr}_2 + -0.43 \times \text{Attr}_3 \\ &+ 0.107 \times \text{Attr}_4 + 0.004 \times \text{Attr}_5 + 0.103 \times \text{Attr}_6 \\ F_2 &= 0.122 \times \text{Attr}_1 + -0.13 \times \text{Attr}_2 + -0.07 \times \text{Attr}_3 \\ &+ 0.884 \times \text{Attr}_4 + -0.26 \times \text{Attr}_5 + 0.328 \times \text{Attr}_6 \end{aligned} \right\} (1)$$

After analyzing these characteristics one can deduce that the sites in the first group do not have as much text on the first page due to the larger font size, which diminishes the number of words per

line. Furthermore, these sites have a more developed structure given that their multidisciplinary mission demands this focus.

The two formed groups have some informal characteristics in museum activity apart from the analyzed factors:

The first group, in addition to expositions, is orientated towards the functions of a cultural, educational, research, and recreational center. This type of museum's activities include events such as theater productions, traditional regional dancing in the streets, archaeological zones or in the museum facilities, concerts, conferences, workshops, courses, contests, expeditions, the preservation of archaeological pieces, etc. The websites of this type of museums have many more options for interaction with museum visitors and website users, for example; forums, guest books, questionnaires, email addresses, telephone numbers, etc. These functions, or multidisciplinary roles of the museums of this group, show that the website is orientated towards at least three types of users: researchers, the local public and tourists. This type of site has options adapted for these groups of users.

The second group is made up of small websites of museums having special expositions well know throughout a wider region, and often have links to places that it would be impossible to show their visitors through other means, for example the house of a painter or other national celebrity, or a railway museum, etc.

They are orientated towards tourists and specialists focused on a specific cultural topic. On the other hand web sites with specific topics do not need much space to present their information. For that reason, they use web resources in a more economical manner, including more text and less empty space on the main page, including fewer menu option and font size that is not so friendly for young users.

The content of the web sites of these museums is more or less fixed, they don't have the tendency to update frequently, and the mission of these museums is primary focused on tourism. The structure of the site is more or less developed; the texts are written in a smaller font, they have few tools for user feedback.

The two groups of regional museums have different missions and character in the representation of material.

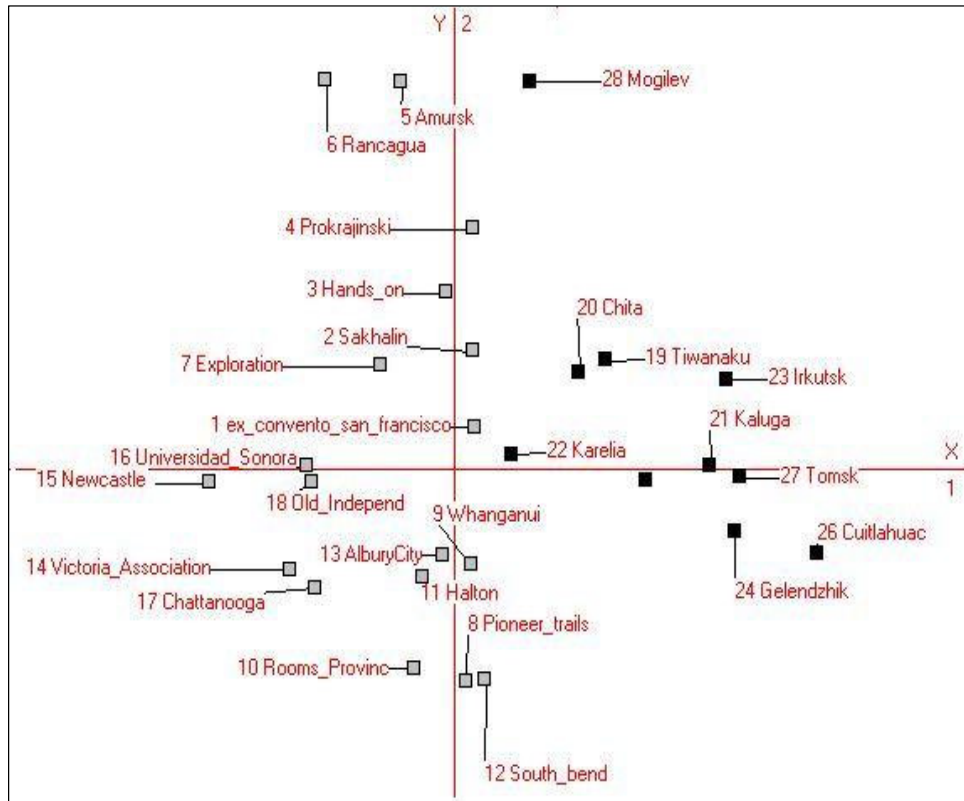


Fig.1 The 28 Websites' disposition in the space of principal components Number 1 (axis X) and number 2 (axis Y)

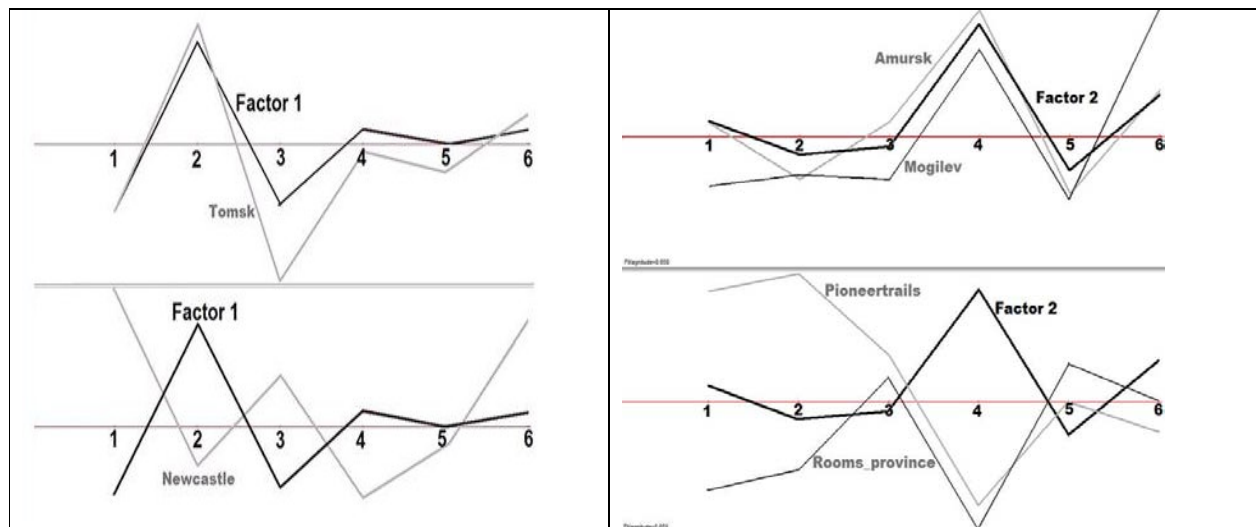


Fig. 2 (a) Factor 1 and Websites of Tomsk y Newcastle  
Fig. 2 (b) Factor 2 and Websites of Mogilev, Amursk (upper part),  
Pioneer trails and Rooms province (bottom part)

Both groups of web sites are groups of successful museum sites. For that reason, it is necessary to choose one of these models. It is not possible to create a combination of these two groups, as the attributes they are made up of are contradictory.

### 3.4 The rapid prototype design.

The result of the analysis is used to form recommendations for the creation of an experimental website as a prototype of the final website and as a model for the creation of other similar sites.

Based on the results of the analysis of the websites, the parameters of "ideal structure" of site model were corrected for the creation of the website of the Regional Museum of Huajuapán de León, (known by its' Spanish acronym MureH) in the Mixtec Region of the state of Oaxaca, Mexico. The results can be seen on the Internet [6]. This museum has all of the traits that are characteristic of the first group. MureH site is used as a research object for the future creation of other websites for regional museums in the Mixtec Region in the states of Oaxaca, Puebla and Guerrero.

This site is orientated towards three types of users: youth from the Mixtec Region, Scientists and Specialists of Mixtec Culture, and immigrants from the Mixtec Region to other regions or countries. For this last type of user it is important because they feel the need to maintain contact with their cultural roots.

The speed of Internet connection available in the region was considered in the creation of the prototype. The site should be easy to use, with a balanced tree type structure that eases the addition and renovation of content, anticipating the possibility of including feedback devices in places with easy and fast access. Some of the most important recommendations for this first stage in the design of the website for the regional museum, the recommended parameters and structure, have been published in [7].

The web pages designed for MureH meet the standards of the W3C as they have been verified with the tools provided by the W3C [8], the accessibility with TAW [9] and BOBBY[10]. This shows that there are no errors or warnings in the design of the templates used in the pages of the MureH website.

Websites of the first group have some special attributes, which it was difficult clearly recognize in the general sample. But if we are to study only websites of the first group then we have to include

new attributes, which have most of the studied sites in the first group:

- Presence of educational programs and/or night schools in museum;
- Organization of excursion or tourist groups;
- Demonstration of the results of scientific studies. (Organizing of conference, any form of publications, reports in Internet; etc.);
- Interface for contacts with users (FAQ, book for web visitors, forums, registering, questionnaires, (at least) easy of access e-mail etc.).
- Special out-of-museum activities (parades, carnival processions, theatrical performance, show etc.)

The museums of the second group as a rule do not have this kind of activities.

The feedback interface gives an opportunity to reveal users of different degree of activity and with different roles in revealing users' needs and expectations.

### 4. Monitoring of site visiting.

The MureH Website is used as a toolkit for testing of hypothetical users' model by monitoring and different type of feedback with users.

In this second stage of development, we need to supply the site with feedback elements for the user. These elements provide contacts for different levels of collaboration with the user. As a first action to make contact with the user, there was an event to present the museum's website to the public and CDs containing the first version of the website were distributed to educational institutions in the region. This action generated a small group of users who have been included in the design team for the development of a sub-page about the Mixtec Language and an English version of the website. The email address of the design group has been included on the main page of the site. Later, a visitor's forum and a user register will be added to the site. The later is necessary to expand the function of the site's digital library.

At the same time, access to the site was monitored. This is a passive, but very productive way to study the characteristics of the users and their areas of interest.

The monitoring showed that during the first seven months 3113 visitors were registered; 63% of users accessed the site through search engines, 21% accessed the site directly, and 18% of the visitors through a web reference. We have identified an increase in the number of accesses through search

engines as well as the number and type of words used to find the site through these engines.

Table 2 shows to total number of visits to the site by city and country. Considering that the site is in Spanish, therefore visitors would have to know Spanish to visit the site; the visits from countries where Spanish is not spoken (except for USA) are considered to be scientists/academics. (See table2). The amount of visitors from Oaxaca (including Huajuapán) is 17300 persons higher than from Mexico City. It is difficult to imagine that Oaxaca and Mexico City have the same number of researchers; therefore it is assumed that the majority of researchers come from Mexico City and other countries where speak Spanish and the majority of the users from Oaxaca are young people.

The proposed user models have been reaffirmed, through the monitoring of the locations of users who have accessed the site. The locations with the largest number of visitors are Mexico City and the state of Oaxaca, which includes the Mixtec region. The third group was made up of users from the United States of America. In the case of users from the United States, we have identified the largest concentration of users in the states of California, New Jersey, New York, Illinois, Texas and Oregon (See figure 3) - States that are known to house a large number of Mixtec immigrants. We have noticed that visits from users located in the United States are distributed more or less uniformly throughout the week, but in the case of visitors from the state of Oaxaca and Mexico City accessed the site primarily on workdays (Monday to Friday). From the on-line social network "*El Directorio Oaxaqueño*" (The Oaxacan Directory) a list of active users of Mixtec origin living in various states in the United States was obtained. Statistics showing the number of visits to the website from US users by state were obtained from Google. Table 3 shows these numbers. The correlation coefficient between these two distributions is 0.966; this shows that the visitors to the site are almost certainly Mixtecs.

The results of the monitoring are the geographic distribution of users to access the site and which days of the week they accessed the site. This shows us that the three proposed user models (youth, researchers and immigrants) are correct.

In the first seven months, the site has risen to the nine position (on the first page) in the search engine Google, which generates 429,000 hits on a search with the key words "regional museum" in Spanish without adding any additional words to locate MureH or give any indication of the region.

This position makes the site successful (for it's popularity). Among non-profit websites, this is the same criteria used to choose that were considered successful to make up the initial study group of sites for the proposed methodology. The site's popularity rose sharply at the beginning of 2008 (see Fig. 4) and hasn't gone down since.

So, the objective of creating a quick prototype of a successful website, has been achieved and there is evidence that the proposed model coincides with the real model.

### **5. Forms for communication and collaboration with real users.**

From the point of view of the user, a passive form of collaboration has been used. A monitoring system was implemented. With the statistics of key words used by the users to find the site from search engines, a dictionary of search words was prepared to show the areas of interest of the users. These areas of interest were considered to be a proposal for the type of connection the real user needs.

The results of the analysis of words used to search for the website in search engines can be used to modify the content and meta-tag of the site, adapting it to fit the needs of the users' interest, for example, to famous persons, mentioned in MureH site, by opening new topic "Famous Mixtecs". Various active forms have been used to as an invitation for user collaboration. These forms have resulted in variable success. For example, in four months there have been just 10 responses to a questionnaire sent out.

There have been communication problems with Mixtecs living in the USA. A letter from the president of the museum patronage was sent out to all the member of the Internet social network "*El Directorio Oaxaqueño*" (The Oaxacan Directory) with a request that they respond to questionnaire on the MureH website. Not one response was received, but an increment in three times the number of visits to the site by users located in the US was detected in the days following that letter (See Fig. 5).

There are other perspectives for the development of the site require collaboration with the users. Working with local social networks has generated stronger feedback.

A strong need for material with information about the region accounts for the success of the site.





Figure 3. Visits distribution in the USA.

Table 2 Visitor statistics by city and country

| City/Region                        | Visits% | Country                    | Visits% |
|------------------------------------|---------|----------------------------|---------|
| Mexico City                        | 26.24   | United States              | 9.71    |
| The State of Oaxaca with Huajuapán | 31.80   | Spanish speaking countries | 7.32    |
| Other Mexican states               | 23.32   | Rest of the world          | 1.61    |
| Mexico total                       | 81.36   | Abroad total               | 18.64   |

Table 3. Comparison of visits to the web site with the number of Mixtecs in “El Directorio Oaxaqueño” in the USA.

| State      | Mixtecs in “El Directorio Oaxaqueño” | Visits to the MureH site |
|------------|--------------------------------------|--------------------------|
| Arizona    | 7                                    | 3                        |
| California | 137                                  | 68                       |
| Florida    | 17                                   | 0                        |
| Illinois   | 24                                   | 11                       |
| New Jersey | 43                                   | 19                       |
| New York   | 18                                   | 19                       |
| Oregon     | 26                                   | 7                        |
| Texas      | 14                                   | 10                       |
| Washington | 41                                   | 7                        |

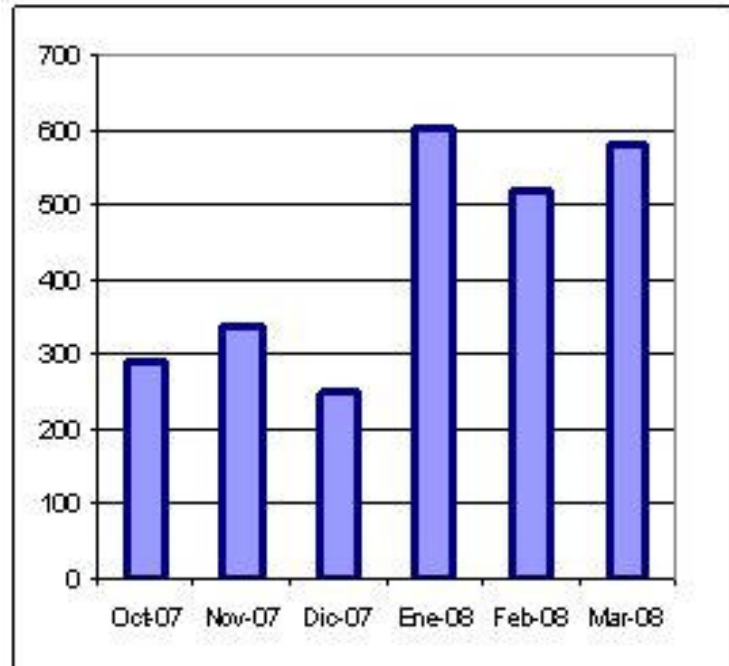


Figure 4. Distribution of site visits by month.

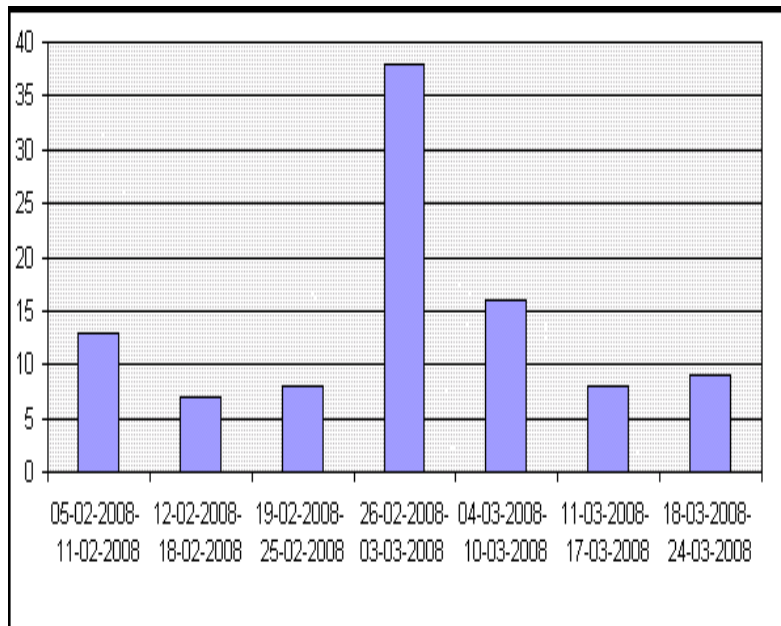


Figure 5. USA Visits' distribution before and after Mixtec opinion poll.

In some rural communities in the region the majority of the population is still illiterate and those who are not, tend to be the local primary school teachers who are not originally from the community and do not know the culture, traditions, legends, customs, history, etc. The curriculum for the state primary school, for example in third grade, requires the use of material about local and regional history, geography, and culture. But in the geography textbooks, the Mixtec Region is mentioned only on state maps and there are usually about twelve phrases that mention "mixteca" and nothing about individual communities. Due the situation of mass depopulation of the Mixtec Region caused by immigration, some educated people are worried about the conservation of their culture and roots and have begun activities to remain in contact with their home communities to carry on their cultural traditions. These two demands:

- the need for educational materials, and
- the need to conserve ones birth culture

Coincide with the mission of the virtual museum. For this reason contact with social networks made up of various types of cultured people have been productive. The majority of these people are:

- teachers of Mixtec language primary schools.
- collectors of local legends, folk songs, handicrafts, cave paintings.
- archeologists
- historians
- painters
- musicians
- administrators of regional museums
- clergy
- people with family archives
- craftsmen and women
- specialists in the humanities, etc.

As part of the local society, these persons are not indifferent to the problems of conserving and developing local culture.

Based on these contacts, specific demands of the local society have been identified, and with their support materials have been accumulated for the creation of virtual museums about the Mixtec Culture.

Three special cases have been identified. The first case is the need to create a virtual museum for a real museum. This is the case of the website for MureH that has been developed, the web site for the museum of Tequixtepec, the website for the museum of San Juan Raya, and the website for the museum of San Jose Chichihualtepec, which are in

the process of development. These sites contain archaeology, history, and local tradition collections and the principal bases of the virtual site is the material in the real museums' collections.

The second type of website is when there is not an existing museum, but there is sufficient material in the social network to create a virtual museum. In this case the virtual museum will take the place of a museum, and can be considered a point of connection with immigrants from the community and as a teaching tool for the teachers of the region. One example of a virtual museum is Chazumba. This case presents itself when the local social network has a high level of self-organization and adequately represents the needs of the population.

The third type of website has recently been discovered when there are developmental problems in extremely poor areas, one example in the area is the community of Yucunaa, which has been chosen for the program 100x100 by SEDESOL (SEDESOL is the Spanish acronym for the Secretary of Social Development, 100x100 is a program to raise the standard of living in Mexico's 100 poorest communities) as an example of a highly marginalized community. In this region, there is total illiteracy among the adults, and more than 80% of the adults do not speak Spanish. Their children do not have adequate educational materials about their region. In this town of 1300 residents, only 9 people are not natives of the town, among them are the teachers of primary school, secondary school, and the rural doctor, people who do not have information or materials about the local culture. The residents of the town live in houses spread out over a large area and they are not in the habit of utilizing community organization and self-help strategies common in Mexico, in Spanish "mano vuelta" similar to the English saying, "If you scratch my back, I'll scratch yours". There are few people with essential knowledge about the history of their town. In these conditions, to support the education of their children and grandchildren, the people have decided to collect the evidence of their town's history, for example old photos, and objects that have been in the family for generations for the creation of a virtual museum. We have been able to observe the process of creation of social networks that the action of collecting items for the virtual museum has started. In this case, new difficulties have arisen in the process of creating the website due to the fact that the town only has three Internet connections. For that reason, the content of the website can be put onto CDs so that the information can be accessed on the computers in the primary, secondary school and the local

government official's offices without an Internet connection. As shown in [11] this form of presentation of teaching materials is very useful in the educational process for use in class.

Another challenge of this site is that it needs to be orientated towards children who have some knowledge of Spanish, and adults who are not bilingual, and do not read or write in the Mixtec language (which is primarily a spoken language). For this reason, the site must be designed with special characteristics such as buttons that are images which are well known in the town, each object must have an audio explanation, and the pages should have a limited amount of text in Spanish. Another specific feature of this site is the content the site needs to have explaining the SEDESOL program in the town. Including the problems which have given the town the classification of "highly marginalized" for example the shortage of potable water, the lack of arable lands with a grade of less than 15°, deforestation and the use of wood as the primary fuel source, etc.

Contrary to this case, other museums in this group will have a structure very similar to the successful MureH site, and only need their unique materials entered into the model.

## 5 Conclusions

The problem of User Centered Design in the case of non-profit website of regional museum can be resolved by preparing an experimental website to be a model for a group of websites which share some creation principals to enable the study of real users of the experimental site and the potential users of this group of sites. This way we can establish design principals for the creation of other similar sites for this region or this portal, respecting the individual characteristics of each site.

Based on the principle hypothetical user model, the study of similar Websites, and the creation of a rapid prototype of the Website it is easier to rapidly develop a final version of a Non-commercial regional museum Website

The Non-profit websites of regional museums could be presented in various languages, and each site in each language could take into account the individual characteristics of the users who access the site in that language and include this information in the final user model. For example, local cultural centers that are oriented towards inhabitants of their region and who all speak the same language can also have a different presentation for foreign tourists who speak a different language. The topics that are interesting

for foreigners (tourists) might not be as interesting for local users and vice versa. In general, for-profit websites have not taken this difference into account and the translations of these sites are literal. That's to say that the for-profit websites in different languages are the same.

The methodology developed in this study is useful in the creation of websites for regional museums and can also be applied to the creation of websites for public educational institutions. The MureH website is a successful model and for this reason can be considered as a model for the creation of regional museum websites, at least for the region of southeastern Mexico.

The experience of designing Web sites for museums needs to be customized as design pattern for later implementation as proposed in [12] including Capability Maturity Model Integration (CMMI) process improvement approach that provides organizations with the essential elements of effective processes [13].

We have planned the following steps for ongoing research: The preparation of versions of the website in different languages, the integration of a library of documents about the Mixtec Region with special search features [14], the creation of websites about the Mixtec Language, including educational and research materials, the design of sites on specific topics that meet the preferences of the active users, and adding new material to the existing website including pages about archeological zones and community museums. The site can be considered as a support in the self-organization of cultural processes in the Mixtec Region.

Due to the large quantity of diverse materials that are required for the design of virtual museums, a portal is needed to organize and distribute the material. The Portal of Mixtec Culture ([www.cumix.org.mx](http://www.cumix.org.mx)) is being developed. Its diverse parts are in various stages of development. The portal includes the sub-sites, digital library, regional music-dance-and songs, culinary culture, Mixtec language classes, recent events in the cultural life of the region, handicrafts, "famous Mixtecs", websites of six museums, two archeological sites, and two sites with cave paintings. Each of these sites needs different tools for its creation, such as PHP, multimedia, CSS, JavaScript, etc. And each one of these sites needs to take into consideration downloading times for slow Internet connections. Figure 6 shows our prototype of the main page of the portal of Mixtec Culture.



Figure 6. Rapid prototype of the Mixtec Culture Portal

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