Implementation of Internet Technology for Local Government Website: Design Guidelines

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Abstract

There may be limited resources for local government website designers to devote to innovative design. This study investigated current technology use by local government (Town of Blacksburg, TOB - Virginia) and suggests key design guidelines. Observation and interviews were used. Using recommendations in phase I, the TOB employed a blog that was investigated in phase II. The TOB incorporated traditional media with online to broadcast public meetings via TV and online. We suggested using indexed video to improve usability by shortening the amount of time it took to find specific information. We also recommended the Task Force blog be linked to an aggregator site for blogs in the region to increase opportunities for discussion and commentary. Such linkage would also make it unnecessary for the Task Force to open comments to the public directly on the Task Force blog, which was primarily used for commentary among panel members.

1. Introduction

Digital government, also called e-government, supports the civil and political administration through information and communication technologies [6]. The e-government provides comprehensive government services by using Web portals (i.e., e-services). In general, an e-government portal currently provides 100-200 e-services [7]. Although implementing 10 to 15 services on an integrated portal is more likely to run to $100 million or more [1], the number of e-services provided in the e-government portal is growing [7]. Although local government is generally the least innovative, all levels of government are interested in utilizing this approach to deliver services [27].

Besides governments' utilization of the Internet, studies have observed that many other Internet users take advantage of the Internet to get information, especially information associated with political issues. The number of Americans using the Internet rose rapidly from 58% in 2002 to 70% in 2006 [11]. Home broadband penetration has increased from 60 million Americans in March 2005 to 84 million in March 2006, which increased by 40% [11]. In addition, recent research [12] discovered that 79% of the broadband elite (being better educated and having a high income) have used Internet to find news associated with politics and public affaires. Thus, it is expected that the percentage of those who use the Internet as a means of seeking political information will continue to rise.

Over the past few years, it was not easy to find local level political information through the local e-government. In 1995 only 8.7 percent of local governments had a website where information/services were available [24]. However, the implementation of web technology by local governments has significantly increased to 83.7 percent in 2000 and 70 percent of local governments without web sites planned to set up web sites within the next year [20]. It is anticipated that the local e-government will be used as one of the primary sources for local communities to get political information.

As a major political information source, the local e-government success is important in local communities. According to previous research [23], successful implementation of e-government depends on well-designed technology which supports user performance. However, a current study [3] discovered that even experienced-personal computer users are frustrated with confusing menus, indecipherable dialog boxes, and invisible functions. Therefore, it should be ensured that interface design of a local government website supports the performance of politically-interested internet users.

In general, most government websites tend to follow design guidelines of commercial websites despite the fact that the two kinds of websites have different characteristics [27] and consumers. For instance, the difference between a government website (interaction between government agencies and the public) and a commercial website (interaction between company and customers) is based in differences of users' characteristics and information required [27]. First of all, the target group of government services could be everyone. It will eventually lead to greater deviation due to users' gender, age, education, career, income, literacy, etc. Accordingly, information needs of users become diverse as well. On the other hand, the commercial websites focus on major customer groups, which will lead to a set of specific design guidelines. The commercial websites will be more likely to gratify users' needs.

Additionally, Kano's Model of Quality [26] found that business organizations are more likely to design a website which will encourage customers to be excited enough to stay longer or purchase products. Government websites do not need to stimulate the public to stay longer but provide them with desired information in effective ways.

Thus, the e-government design guidelines should be developed to ensure that mental model of politically-interested Internet users is identical to the design model. One of Norman's principles of design for usability (2000) is that designers should structure a conceptual model into the system to fit the users. Accordingly, if the conceptual model is coherent to the users, it will result in an appropriate mental model in the user's mind. This will ultimately enhance the usability of the website. The government website should consider the needs of users in order to be coherent to the users' mental model. For instance, the mental models are constructed through users' experience in real life (Norman, 2000). Hence, citizens visiting the government website might expect a cyber meeting space since they usually go to a physical meeting place to deliver their opinions. However, only a few of the local e-governments perceive such needs and employ the online discussion forum /blog technology on the government website.

This current study was conducted in two phases. The first phase aimed to develop a set of design guidelines for local town government website. The second phase was a longitudinal study that investigated how the blog set by Blacksburg town government was utilized.

2. Phase I: Development of design guidelines for local town e-government

2.1 Methods

2.1.1. Participants

Seventy-five participants from the town of Blacksburg, VA, with a population estimated at 46,000 in 2005 [14], participated in focus groups between 2002 and 2005. The skill levels of the participants of this current study ranged from novice to experienced Internet users. They were mostly a population who had been using the Internet to find online information related to local news items.

2.1.2. Equipment

An audio recorder was used to record group discussion.

2.1.3. Procedure and data analysis

The focus group was conducted 6 times independently at a local public library. Instead of mostly asking participants specific questions, the discussion in the focus group was performed at a fairly high-level; therefore, a moderator just introduced topics and facilitated their discussion. However, a follow-up question was allowed in the meantime to elicit relevant information by the moderator. The discussion in the focus group was recorded for further analysis.

Transcripts were made from the audio tapes to support. NVivo software was utilized for the focus group data analysis. As one of qualitative data analysis methods, theme-based content analysis was conducted to develop interface design guidelines for the government website.

A traditional focus group analysis counts the number of times each word occurs among participants' statements [17, 25]. The more often participants state a particular word, the more significant meaning the word will have. Instead of the traditional format, we used theme-based content analysis (TBCA), which is a context-based analysis; that is, a large amount of raw data may bring more information rather than simply considering words individually [18].

Thus, we did not analyze the focus group data in the way the traditional focus group analysis was done. The focus groups in the present study were mainly designed to investigate how politically interested internet users make use of the Internet to seek/diffuse desired information among the community group. Thus, interface design issues were not major discussions among the participants. However, it could not be ignored that they discussed the interface design issue. Even if a single word (or statement) was mentioned once by only one participant, it could be a critical factor to enhance the interface design in terms of usability. Based on the TBCA theory, we identified usability requirements associated with interface design through the participants' discussions. The collected requirements were classified according to the definitions for main categories which are performance, user activity support, content, look& feel, and security (see Table 1).

Table 1. Components for main and sub category

Main category	Definition of main category
Performance	An interface allows accomplishing their task quickly. No error was expected in operation.
User activity support	An effective interface design supports users' needs by providing various functions.
Content	A good interface displays web contents in effective ways to enable users easy to understand/find desired information.
Look & Feel	An interface allows users to develop familiarity while they visit the website over time.
Security	Users feel safe from leaking personal information.

2.2. Results

Once the participants' responses were classified into the 5 main categories, a chuck of responses in each category was broken down into detailed subcategories (see Table 2). For instance, the main category, user activity support, was developed with eight sub categories such as multimedia, involvement, navigation, open system, respond, register, built-in emailing function, and different point of view. In order to organize the data, a table (see Appendix A) was developed with four columns labeled main category, sub category, recommendation as well as sample comments quoted from the participants', and responses to support the recommendations.

Table 2. Each main category is further broken down by a number of subcategories

Main category	Sub category
Performance	Download delay
	Broken links
User activity support	Multimedia
	Involvement
	Navigation
	Open system
	Respond
	Register
	Built-in emailing function
	Different point of view
Content	Hierarchical structure
	Suggested keywords
	Internal search engine
	Versatile
	Incorporate traditional media with online
Look & Feel	Maintain consistency
Security	Spam mail

Participants would like to compare their own thoughts with others before they come to a conclusion. Even if the source is a major local newspaper (i.e., Roanoke Times) in the local community, they still seek other sources to get the same news with different points of view. They tried to avoid being biased by one source. They believed that hearing others' opinions through alternative media helps people make better decisions. The media would be the newspaper, TV, radio, word of mouth, or Internet news site. For example, a participant used blogs to get political information where different points of view are available. It is recommended to provide citizens a place to post their own thoughts and compare with others online.

Although participants in this current study were a group who was able to take advantage of the Internet to get information, they still relied on the traditional media (e.g., TV, newspaper, or radio) as a major source. In-depth information is supplemented with the Internet. Accessing the traditional media such as TV is much easier for them than Internet since these traditional media were deeply integrated in people's life and easy to reach. It is recommended for the e-government to incorporate traditional media platforms to diffuse information to citizens.

In Blacksburg, Virginia, one of these recommendations (i.e., implementation of a blog) has been tested. Phase II was a longitudinal study to investigate how the implemented technology was working and aimed to enhance the usability of it.

3. Phase II: Usage of a blog by the town of Blacksburg and citizen Task Force

In Blacksburg, Virginia, 91% of the population (estimated 43,000 in 2005) reported in 2002 that they used the Internet [14]. The population of Blacksburg is largely affiliated with faculty, staff, or students at Virginia Tech [14]. The citizens of Blacksburg were highly interconnected by the Internet and this infrastructure of a strong community network was the best environment to test a new implementation for e-government. The Town of Blacksburg (TOB) government set up a beta version of the blog (https://secure.bev.net/townplan) for a Comprehensive Plan Task Force meeting. Various documents (e.g., meeting agenda, preliminary version of plan proposal, etc.) related to the meeting were regularly updated on the blog, which was open to the public. However only the meeting panel comprised of citizen volunteers and committee members were allowed to post their comments on the blog. Since the public was restricted from making comments on the blog, they were supposed to use email or a phone to provide opinions. In the phase II study, we aimed to observe interaction of the blog between the panel's online meetings and offline meetings such as, how the blog came to be utilized among the panel. In addition, we got feedback from the panel through a questionnaire toward the end of a series of meetings.

3.1. Methods

3.1.1. Participants

An observer was assigned to regularly participate in the Comprehensive Plan Task Force meeting in Blacksburg, which was open to the public. The panels of the meeting were comprised of nine individuals who were equally authorized to post a comment on the blog using a unique password and ID. Of the panel, eight individuals who had experience with posting a comment on the blog were chosen to complete the questionnaire.

3.1.2. Materials and Equipment

A blog (https://secure.bev.net/townplan) which was set up by the Town of Blacksburg (Figure 1) was the target to investigate. In addition, a questionnaire was used to get users' feedback about the blog. The questionnaire was consisted of open-ended questions and closed questions. For open-ended questions, participants were asked what they liked most and least about the blog. The closed questions were designed to rate user's satisfaction in terms of 'easy to read', 'easy to post', 'easy to navigate' and 'comfortable to communicate'. Those four items were asked by using 5 point Likert type scale (see Figure 2).

Figure 1. Snapshot of the blog of Town of Blacksburg

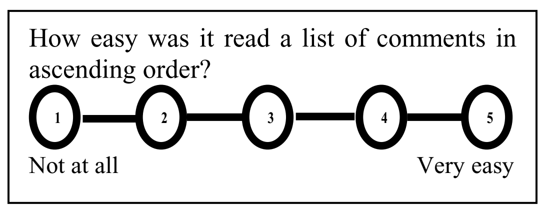

Figure 2. Sample of closed questions

3.1.3. Procedure and Data Analysis

Since the blog was set up in April 2006, the observation had been conducted. In addition, between May and June 2006 an observer kept attending a series of meetings as the public to observe how the blog was utilized, which included communications between the panel (offline and online), interaction with the public, etc. During the observation there was no intervention to push the panel to use the blog.

The observation was analyzed through critical incident technique (CIT). Identified blogging behaviors of the panel were categorized into four items such as 'interaction between offline and online meeting', 'encouragement of feedback', 'public involvement', and 'connection'. Recommendations (if available) were provided to enhance the blog as well. All were organized into a table which consisted of six columns labeled Category, Condition, Actions, People, Place, and Recommendation called a CCAPPR table [15].

In June 2006 toward the end of a series of meetings, the questionnaire was distributed to get feedback from users (i.e., the panel). After the procedure was completed, a probing question was used to gather more specific data regarding their answers or clarify their answers. An example of it was below:

Participant: Wiki allows everyone to write their own opinion.
Interviewer: Would you be reluctant to see someone's comments which might be insulting to your opinion?

3.2. Results

The results of the phase II consisted of two parts; one is for the observation and the other is for the questionnaire. First of all, the observation is presented in the CCAPPR table by the critical incident technique (see Appendix B).

Since the blog was being tested, the public was not allowed to post their comments on the blog but they could read the panel's comments. Thus, activity of the public bloggers was not considered in the current study. However, we gave recommendations on how to enhance the blog for public involvement. For instance, the blog needs to be linked to a blog aggregator (http://www.swvanews.com), which is able to retrieve syndicated Web content by a web feed (e.g., RSS). The localized blog aggregator will enable local bloggers to keep informed of the news associated with local government administration as well as to get the public ultimately involved with the decision making progress of the government.

The blog was actively utilized for internal communication among the panel. They extended their discussions to the blog by posting their comments and they brought the developed discussion issues back to the next physical meeting. Furthermore, the comments helped some panel members who were absent catch up on items from the meeting they missed.

Secondly, according to results of the closed questions (Figure 3), participants generally showed higher satisfaction (mean = 3.9; SD=0.6) with interface of the blog. However, some participants reported that they got lost and did not know how to get back to the first main page. They expected such navigation tools as 'Home' and 'Back', which normal e-commercial websites featured.

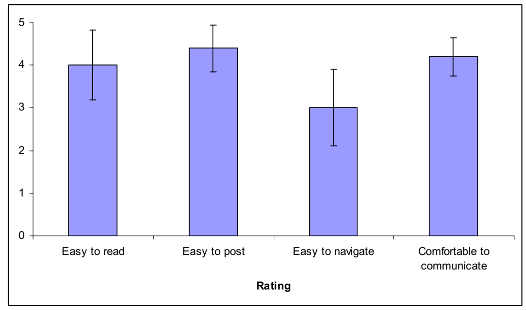

Figure 3. Mean and SD scores for each question

According to their comments on the open-ended questions, they would like to allow the public to post their comments on the blog. One of reasons they like the blog is the open system where they can compare others' comments with their own thoughts. They were willing to listen to the citizen even if their thoughts were different. Respondents in this current study suggested giving the public equal opportunity of making comments on the blog even if the comments were in a cynical tune. Due to the possibility of insulting comments posted by the public, a respondent suggested a Wiki instead of a blog because the Wiki enables tracking down a particular author and closing the author's account. Furthermore, the Wiki enables users to create their own forum/free speech space to share opinions. In addition, a participant would like to have two split windows; one is for various documents posted and the other is for a pop-up window to post comments. Thus, users are able to see the relevant documents at the same time while writing comments on the blog.

4. Discussion

The purpose of this present study was to develop a set of design guidelines for a government website especially for the local populations. The primary design issue that came from the focus groups was to create an online space to share opinions among the general public. They did not rely on only one news source to make a decision. Even if the news source was a major newspaper in the local area, they tried to seek the same news with different points of view. This consequence is supported by a recent research [16]. Lenhart and his colleagues [16] discovered that 44 % of U.S. Internet users (above the age of 18) have published their thoughts online. In addition, 33 million

American Internet users have read or rated something/someone by using an online rating system [21].

As the online reputation system is used to contribute to a decision making system, the blog could be new media for the public to share their opinions to make a better decision. Furthermore, the general public might be gratified with the use of blogs since their mental model expects the government to offer feedback opportunities on their sites. Based on users' mental models (Norman, 2000), the public might try to find an online meeting space in the way they use offline public meetings to express their thoughts to the local government. In addition, the blog is rapidly becoming mainstream, as the latest form of an online communication tool [22]. The blogging pattern becomes interlinked, interactive, and oriented towards external events.

The implementation of the blog technology was tested by the local government of Blacksburg, Virginia. It was observed that the blog was actively used to communicate among the panel for example; 1) a panel leader made announcements of an event/meeting, 2) a revised document was kept updated on the blog, and 3) panels visited the blog to post their thoughts on the revised documents or other comments. According to the questionnaire in this current study, the panel was satisfied with using the blog for the meeting. On the other hand, the minor trouble was to navigate the blog since the interface of a blog platform is fundamentally different in terms of a lack of navigation bars. Basic navigation buttons (e.g., 'Home', 'Back', etc.) should be provided to help bloggers since they got used to the navigation bars on the website.

The beta version blog was basically not opened to the general public to post a comment. Therefore, they should send email or make a phone call to give their opinions. However, the panel would like to allow the public to post their own thoughts on the blog. They were not afraid of getting cynical comments from the public. They liked to give the general public the equal opportunity of making comments on the blog. Once the blog is opened to the public, the interaction between officials and public will be further studied. Until then, the blog needs to be advertised more to the public. It is recommended to link to the local blog aggregator (http://www.swanews.com). More interaction is expected between the Blacksburg bloggers and the Town of Blacksburg Blog.

Besides the need for a blog, the relationship between traditional and online media also needs to be considered. A majority of the respondents from the focus group used traditional media (such as TV, radio, and newspaper) as a first news source followed by the Internet. If they found something attractive on the traditional media, they tried to seek more information using the Internet. The traditional media is more likely to be the first source where people get exposed to new information. According to previous research [4, 13], three quarters of heavy Internet users obtain most of their information from traditional media, which Internet users rely on more than non-users. However, a recent research [12] found that broadband Internet users rely on online as much as their local newspaper but other traditional media (i.e., TV & radio) are still the most popular news source for Americans. It is assured that Internet users, especially among local populations, are still relying on the traditional media to obtain information. The Internet is used to supplement the information that users obtained through traditional media. Therefore, current e-government needs to incorporate the traditional media platform to deliver services. In fact, the Town of Blacksburg has been providing online video archived in the government website, which is available 24 hours a day, 7 days a week. In addition, while most of the online videos are offered through the archive, public meetings are archived as well as fed from WTOB Channel 2, which is Blacksburg's community access television station. Even if the citizens do not attend the meeting, they can review the meeting. Once they find something interesting through WTOB Channel 2 they will try to find more relevant information in the government website. The WTOB Channel 2 in Blacksburg is a bridge to bring the public into the e-government.

However, WTOB Channel 2 does not allow a TV viewer to skip some sections of air programs. Some of them are too busy to keep watching it until the section they are particularly interested in is shown. They might use the online video as an alternative. Although it is possible for them to search frame by frame, it will take a while as well. Cooper [5] proposed a Video indexing tool, which indexes the online video. The indexing tool enables users to find the desired content (by agenda title, for example) in a short amount of time. Future research will investigate the effectiveness of the video indexing tool.

5. Acknowledgement

We are grateful for support from the National Science Foundation Digital Government award (IIS-0429274) for the research described in this paper. We would like to acknowledge our research partners in the Town of Blacksburg and Montgomery County.

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Appendix A. Sample of theme-based content analysis

Main category	Sub category	Sample comments from participants	Recommendation
Performance	Download delay	"Any more sites want to win a beauty contest for that front page, and is that really… we like it to be nice, yes, I agree, but it doesn't have to have all the fancy flash and, you know all kinds of other stuff, that doesn't impress me in the least. And it's not useful."	To remove unnecessary multimedia files (e.g., images, flash animation, etc.)
	Broken links	"The problem is who administrates that and who responds to that and the allocation of resource to monitors that to be a concern. For both municipalities, so the worse thing is to have dead e-mail, you send it and wait a week and no body respond (laughing)."	To keep checking broken links
User activity support	Multimedia	"M: The other thing that the county was considering was video streaming some of the meetings, I don't know if you have ever seen, seen the Blacksburg video streaming, the Blacksburg Site? W: That would be nice get to see the action without actually having to be there, that would be very nice."	To provide online video so it is more convenient for citizens to stay informed about what is happening in town government/public meetings
	Different point of view	1. "Um, national blogs, they are political mostly and I try to get sources of news other than the Roanoke Times because it is very biased and you only get one side of the news." 2. "When I get the material together, I like to get at least two different sources so that I don't have to go by one source."	To provide a cyber space (e.g., blog) to have discussion on the problems in common as well as other neighbor's opinion
Content	Hierarchical structure	"M1: The county site, I'd be interested to hear if you have trouble finding information when you go there. M2: I do at times. It seems to me a bit overly databasy and hierarchically structured"	To avoid having many sub-levels of information; thus, let users find desired information within a few clicks
	Incorporate traditional media with online	1. "I listen to radio a lot in the morning (laughing) which is a big thing" 2. "I'd go to WDBJ7 or one of the local news channels and I access the website a lot." 3. "I mean I don't get up in the morning first thing I do is get on the website and look to see what's happening locally, its radio news predominately." 4. "so it's mostly in the morning it's the newspaper and then on the internet I take a look at the Roanoke Time's site, and also NRV today."	To collaborate on diffusing local news with local traditional multimedia A local government owns a TV channel which produces a number of government access programs for the community
Look & Feel	Maintain consistency	1."Like minutes for instance, I got to like, I can go in 5 minutes I can find minutes from the Board of Supervisors meetings but Planning Commission meetings they aren't there and if I want those I really have to go through the Planning Commission's site and maybe they used to have it there and now it's gone."	To keep consistency of database or webpage's layout for users
Security	Spam mail	"I am not going to give my email to just anybody because I am just tired of spam."	To avoid exposing personal information on the website/listserv

Appendix B. Sample of CCAPPR

Category	**C**onditions	**A**ctions	**P**eople	**P**lace	**R**ecommendation
Interaction between offline and online meeting	Comments posted on a specific topic	Bring a comment from the blog to a physical meeting	Panel leader(s) collect the comment	online(blog) & physical meeting	Regularly check new comments
	Discussion discontinued due to lack of time	Post a comment from a physical meeting to the blog	Panel leader(s) begin the comment	online(blog) & physical meeting	The leader(s) need to maintain the blog alive
Encouragement of feedback	Documents needed to revise more after the meeting	Upload a document on the blog to keep revising	Panels try to revise after the physical meeting	blog (keep track of opinion in chronicle order)	
	Possibility of additional opinion among panels absent	Post outcomes of the physical meeting	Some panels who are absent will try to catch up the meeting	blog	
Public Involvement	The meeting is open to the public. To encourage the public to attend it	Briefly announce about the next meeting agenda	The public who are interested in the meeting	blog	To post the agenda regularly
	To encourage the public to attend it	Make announcements to the public to post their opinion on a specific topic	The public may keep informed of the meeting through existing informal comments	blog	Informal tones of comments make public comfortable
	To keep public informed	Open all comments to public	The public may trust the blog	blog	Do not modify comments
	The blog is at beta testing stage.	Make available to the public the ability to read the blog but not the ability to post a comment	Posting a comment is available internally among panel members	blog	To provide alternative way for the public to deliver opinions such as email, phone, etc.
	To encourage the public to visit the blog	Advertise the URL of the blog in e-government homepage		blog, e-government, & blog aggregator site	To advertise the blog to a blog aggregator site so more bloggers are able to visit it.
Connection	To provide a reference article	Insert a hyperlink to outside websites	Users visited outside website(s)	blog, local e-government website & outside website	