

RECOMMENDING DYNAMIC WEB DESIGN FOR CITYOFBOSTON.GOV

Interactive Qualifying Project Report completed in partial fulfillment

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Abstract

This project formulated recommendations aimed at facilitating the City of Boston MIS Department to improve CityofBoston.gov in the future, with a goal of increased civic engagement. Our approach was to evaluate the current site via both subjective and objective means in order to identify areas that could be improved. Our research combined with conclusions drawn from our evaluation resulted in the creation of a new functional template, coupled with other general recommendations.

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Executive Summary

With website expectations changing on a daily basis, web designers are in a constant battle to ensure that their websites are up-to-date so as to keep users engaged and to meet standards set by the World Wide Web Consortium (W3C). Government websites are no exception to this. An online revolution, known as e-government, has cities all across the world altering their websites in order to enhance the features that they provide to their citizens. E-government websites offer citizens a wide variety of services, such as online payments for parking violations and taxes, as well as opportunities to interact with their government in a whole new way. Many of these opportunities arise from the online phenomenon known as Web 2.0, which represents the development and implementation of user-centric and aesthetically pleasing features. Web 2.0 incorporates a wide range of features, such as opinion polls and RSS feeds, which help to increase usability, user engagement, and accessibility. Due these many benefits, numerous e-government websites have begun to implement these user-oriented elements.

As such, the City of Boston's MIS Department has shown interest in conducting an investigation of how they might incorporate these elements into their website, cityofboston.gov, in the future. More specifically, the MIS Department placed an emphasis on fostering a greater level of inter-citizen interaction, or civic engagement. The investigation of possible improvements with this objective formed the basis for our project work. Our goal was to be able to provide a set of recommendations for future improvements of cityofboston.gov in the form of a functional website template.

In order to reach our goal of attaining better civic engagement among Boston citizens through the CityofBoston.gov website, we composed the following list of three crucial objectives:

1. Complete a subjective evaluation of the current CityofBoston.gov website
2. Complete an objective evaluation of the current CityofBoston.gov website
3. Develop a template for the new CityofBoston.gov website

These objectives were completed through a series of methods that allowed us to evaluate the current website and propose a new template to the Boston MIS Department. A survey posted on the City's website and Facebook fan page made it possible for us to gather feedback from site visitors. Survey questions asked for users' opinions regarding a variety of information, ranging

from website appearance to the location of information on the site. In addition to this survey, through our research, we established two government websites, San Diego and Denver, as good reference points for us to compare CityofBoston.gov to. Through the utilization of several metrics and a general comparison, we were able to evaluate the efficiency of the layouts of our reference points and determine possible Web 2.0 features in these sites that could be incorporated into Boston's website in the future. Also, CityofBoston.gov was run through online validation tools to identify how well the current website adhered to standards set by the W3C. The combination of these methods helped us to not only evaluate the current state of CityofBoston.gov from a user's perspective, but also compare it to other e-government websites. With this evaluation in mind we were able to establish possible changes that could be made to CityofBoston.gov, which were then used as a basis for the creation of our proposed template. We created a coded mock up of the homepage which was then subjected to an evaluation. We ran the template through the same online validation tools and executed the same metrics that we had done on the current site. This new evaluation and template, along with the evaluation performed on the original site, allowed us to provide Boston's MIS Department with a series of recommendations of possible improvements to increase civic engagement and user satisfaction of CityofBoston.gov.

The gathered results of the first two objectives were used to make changes about the aesthetics, navigation, and accessibility of CityofBoston.gov. We used our subjective and objective means, as well as our research to determine the proper solution for problems found in the current website. We concluded that we must change aspects of aesthetics such as color scheme, text, and layout because of our survey results. We made the color scheme on the website darker to increase contrast, so it would comply with the online validation tools. There was no alarming need to drastically change the text font, size, and color, but we decided to increase the size from 10 to 12, to make the website more readable. The layout was changed to make more efficient use of the available space on the website. To improve navigation, we implemented drop down menus and breadcrumbs to provide users with important links of the website at all times and to reduce scrolling. We prepared recommendations on accessibility, such as foreign language options, because of our analysis of W3C standards. In terms of accessibility, we also reduced the amount of text that could not be reached by voice reader assistive tools. We also made Web 2.0

recommendations for a future CityofBoston.gov website, based on our survey results and reference points.

1.0 Introduction

The impact of technology on everyday life has significantly changed how people live, work, and do business. Such dependence on technology has also affected how governments serve their citizens (Silcock, 2001). Numerous governments around the world are turning to the Web as another means to serve their people, similar to how several businesses have done so with the highly successful concept of e-business. A related concept known as electronic government, or e-government, has grown much more popular in recent times. E-governments are important because they allow citizens to quickly obtain government services and contact government officials via the internet without any hassle. They also expand upon the democratic voices of their users, giving citizens another avenue for expressing their opinions. The efficiencies and conveniences of this system have encouraged the majority of government bodies to each make their own unique online presence.

From locations around the world, approximately 15,300 people visit the e-government website CityofBoston.gov each day. The site offers a large amount of information and several services to these visitors. Considering the level of traffic and the importance of the content, it is imperative to have highly effective organization as well as interactive features that engage the user. With the constant evolution of the internet, new methods and standards of website organization are continually being created, as are new interactive technologies. Such new interactive functions have been grouped together under the moniker “Web 2.0”, which has come to represent the polished, user content-centric websites being created. Knowing these facts, the city of Boston’s MIS Department developed an interest in an evaluation of their website in order to determine where the site might be improved in the future. Particular interest had been placed upon the user-oriented Web 2.0 features and how they might be used to the website’s benefit.

The website already allowed users to accomplish a wide variety of otherwise mundane tasks through the convenience of their website. These services varied from simply keeping users updated on city news to allowing them to register pets, pay parking tickets, and look up important policies. In regards to the organization of the site’s information, the main information of a page was usually confined to the singular center column, with navigational links mainly distributed around the four edges of the webpage. The coloring of the website in general used subdued colors and had text with little contrast to its backing.

An evaluation would not have been solicited had there not been a perception of room for improvements. The organization of Boston's website had, while proven to be above-average, caused some users to become frustrated in attempting to locate the information or services they desired. The site was also largely static; it was an information and service resource that neither changed much nor provided much opportunity for users to become actively engaged and contribute to the site's value. In an attempt to make the site more dynamic, there had been an interest in the possible incorporation of Web 2.0 features in order to allow users to interact with their government and each other in new ways.

In order to help address these concerns, we were asked to complete work towards the goal of improving the city of Boston website. During the course of this project we investigated potential features that could have been beneficial if implemented in CityofBoston.gov, as well as ways to refresh the look of their site. We analyzed the site subjectively through the administration of a survey to users, and also objectively through the use of metrics and evaluation tools. The results of this evaluation allowed us to create a proposed template for the website that incorporated beneficial changes.

2.0 Literature Review

The World Wide Web is constantly changing. A significant amount of these changes are due to a rapid increase in user-oriented content as part of a phenomenon commonly referred to as Web 2.0. Such rapid development of internet technologies has influenced the designers of many websites to consider implementing Web 2.0 features. These features encompass the latest technologies that enhance engagement among users, as well as improve accessibility and overall user experience. Some of the more well-known features spawned by this web revolution include: blogs, forums, social networks, and wikis. Their increasing popularity has forced many Web designers to incorporate these and other similar applications into their sites in order to attract and maintain a diverse audience.

These Web 2.0 technologies and the benefits that they carry have not yet been disseminated into all websites of public interest. For example, a majority of government websites in the United States have yet to adopt such user-oriented tools to benefit their citizens. CityofBoston.gov can benefit from these Web 2.0 advancements. This site already contains valuable information for people living in and around Boston, as well as those who wish to visit. However, through the application of Web 2.0 ideas and technologies, both the level of civic engagement offered and the general usefulness of the page in the view of the constituents can be improved.

In order to successfully implement Web 2.0, the set of features that may be effective in this case must be ascertained. Possible features can include homepage customization, RSS feeds, Google maps, multilingual pages, and accessibility features. Other features that could provide citizens with a virtual voice to express themselves are: Wikis, blogs, forums, and chat rooms. This chapter will provide information on the following topics: the role of online government in society, Web 2.0 and its implications, basic concepts for strategic planning, and a general description of important web development issues. Each of these topics plays a role in framing the boundaries of the work to be done, as well as guiding the selection of the set of most useful features to be implemented. Thus, understanding all of them collectively is crucial to make effective progress researching and proposing valuable changes to CityofBoston.gov in order to achieve the goal of greater civic engagement of Boston citizens.

2.1: E-Government

With the internet becoming an integral part of everyday life, government websites can play a key role in developing the relationship between a city's government and its residents. Not only is it a place where people can gather information about local events and news, but it is also a place where people can interact with the government and other people in their area. E-government is a term for the use of information technology, such as online websites, to provide services and information from government agencies to the general public (Layne & Lee, 2001). The subsequent sections present descriptions on the following characteristics of e-government:

- Providing Online Services
- Information Access
- Civic Engagement

By taking advantage of these aspects of e-government, a city's website can become a useful tool that allows citizens to better their local community.

2.1.1: Providing Online Services

According to a study completed by West (2001) in which 1,506 government websites from 70 different cities in the United States were analyzed, one of the most common roles that government websites play is providing online services for citizens. For example, residents of a city are able to make a variety of payments online ranging from traffic violations to taxes to registration fees. Additionally, residents can submit forms that allow them to make complaints about occurrences in their city or report issues like burnt out street lights and potholes. Other forms, which allow citizens to do tasks such as obtain building permits and business licenses, can also be downloaded and submitted online so that citizens do not have to leave their home (Kaylor et al, 2001). In the Netherlands, the internet is also a place where scholars can organize protests for which they feel strongly about (de Kool & van Wamelan, 2008).

2.1.2: Information Access

In general it is usually quite simple for a visitor of a government website to access a variety of important information, such as storm warnings and public

announcements. In addition, other major events, such as the construction of public buildings, are typically available for members of the community to read about. Through video and audio clips, residents are capable of viewing city council meetings while visitors can be led on a walking tour of the city. Documents providing meeting minutes, zoning information, policies, and budget reports can also be posted for the public to access (Kaylor et al, 2001). By using government websites, it is possible for citizens to become well-informed on a wide variety of information allowing them to better participate in their community.

2.1.3: Civic Engagement

Another role that a government website routinely assumes is to connect government officials with citizens. Modern web technologies make it possible for officials to post letters or videos to their constituents online, thus allowing the public to become familiar with the officials in their city. Frequently, site visitors are able to find contact information such as email addresses and office phone numbers for their city administrators. In his study, West noted that 25% of the websites that participated also contained links to other government agency websites, thus facilitating viewers in the retrieval of information necessary to communicate with other agencies without the need to go to other websites (West, 2001).

Beyond connecting citizens with their government, current technologies allow citizens to reach out to other members of their community. Residents may be allowed to share pictures and post comments and experiences so that other people can read them, thus fostering relations between the citizens of local communities. Often, government websites contain a place where the public can post comments in order to provide feedback, thus making it possible for citizens to have a direct impact on their community (West, 2001).

Online services, information access, and civic engagement are three crucial aspects in the development of a high quality e-government website. Ultimately, it is these features that make it possible for citizens to interact more closely with their city's government and its officials.

2.2: Current State of CityofBoston.gov

After understanding the features of a high quality e-government website, it is necessary to determine what CityofBoston.gov currently has to offer its users. Factors such as the overall design, website content, and implemented features must be taken into consideration when evaluating the current levels of civic engagement and usability that the website provides. Shown in Figure 1 is a screen shot of the current CityofBoston.gov website, which will be discussed throughout the following sections.

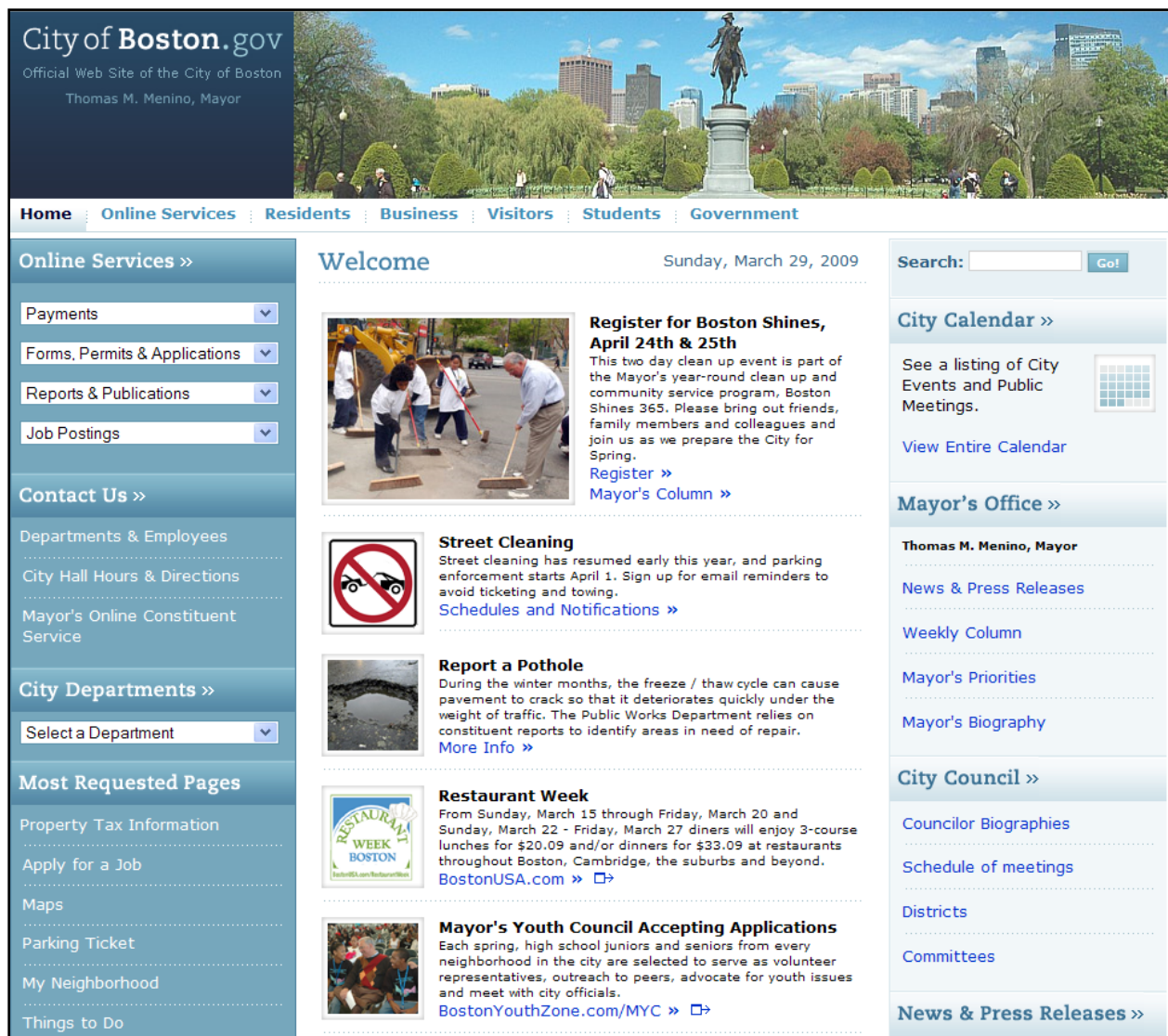


Figure 1: Current CityofBoston.gov Website Homepage

2.2.1: Overall Design

At first glance, the overall layout of CityofBoston.gov appears to be consistent throughout the site. Each page can be broken down into five main sections: page header, top navigation bar, and left, right and center columns. In general, the page header contains the site name and a scenic picture of Boston. Directly below the header on all pages is the top navigation bar. This bar contains direct links to constituent specific pages as well as the online services page. Just below the navigation bar, the rest of the website is separated into three columns. In the left and right columns, users can find direct links to important information such as city departments and the city calendar. The middle column typically consists of a wide array of information for each page. For example, the middle column on the homepage has stories and announcements pertinent to current events.

However, after taking a closer look, users can see that the content organization varies from page to page. Generally, the right column contains links that can be categorized into the same groups such as calendar, related links, and announcements. However, the order of these links is not necessarily consistent between pages. On the other hand, the left column consists of quick links that vary from page to page. The content that can be accessed by these links is related to the subject of the current page. In addition, the left column not only varies in content but also in color. On the homepage, the colors of the left column are consistent with the color scheme in the header. Although the header colors remain the same throughout the site, the left column changes and therefore the two become inconsistent on all other pages.

2.2.2: Providing online services

As stated previously, online services are a major aspect of e-government. CityofBoston.gov provides a wide variety of online services. Immediately upon loading the homepage, users can see links that allow them to make online payments, access forms online and look for job postings in the area. If users decide to take advantage of the ability to make online payments, they can do anything from paying parking violations to paying their taxes. Unlike online payments, forms cannot be completed on the website. Instead, they must be downloaded, printed off, and mailed in. While this may be more

convenient than having to go to City Hall to get the forms, users who do not have access to a printer cannot make the most of this online service. In addition to these online services, users are able to submit complaints and service requests to the mayor's office directly from the site. Although there is a link to access this page on the homepage (labeled as the Mayor's Online Constituent Service), it is not as obvious as the other online services and thus slightly more difficult to locate.

2.2.3: Information access

Similarly to online services, constituents can access a wide array of city information easily on CityofBoston.gov. For example, users in search of news involving all aspects of the city can retrieve this information in multiple areas on the website. Policy and budget reports, although difficult to find, can be found on the site. Additionally, announcements are not only posted on the homepage, but users can also acquire City Council meetings minutes, which are posted on the website going back as far as 2001. Even though recordings of City Council meetings are not posted online, CityofBoston.gov does offer a range of other videos on their website. Access to these videos is somewhat difficult because it can only be found on certain pages. In addition to viewing information on the website, users are also given the opportunity to subscribe to e-newsletters and RSS feeds so that they can receive updates via their own email accounts.

2.2.4: Civic engagement

Even though CityofBoston.gov provides users with online services and a variety of information, the site is limited in the ways in which users are able to interact online with each other and their government officials. By clicking on the "Contact Us" link on the homepage, users can find contact information for their government officials. This allows residents the chance to email or call various people in different departments throughout the city. The homepage also contains links to other government websites such as Mass.gov and USA.gov (not visible in screen shot) for users to take advantage of. Another way for citizens to interact with their government officials is through online opinion polls; however, CityofBoston.gov currently does not contain polls for users to

participate in. While these aspects, when implemented, allow citizens to connect with their government officials, they do not allow for interaction between city residents. Currently, there is nowhere on the site for citizens to post comments or have discussions about city events with other users. Although citizens can provide feedback to their government officials, this information is not publicly available. Thus users who provide feedback have no way of knowing what other citizens are concerned with in the city. By allowing users to have discussions on common concerns, it may be possible to bring more awareness to problems and thus get citizens more involved in the community.

By analyzing the overall design, existing services, and content of CityofBoston.gov, it will be easier to both expand upon those ideas already in place and suggest new ideas to consider.

2.3: General Principles of Good Web Design

An appealing and easy to use website is more likely to cause a higher percentage of individuals to interact with it. This is partially because each individual may attempt to access the site under radically different conditions and goals, and will expect to achieve this goal in a relatively straightforward fashion. The US Department of Health and Human Services has published work noting that the informational content of a webpage should be organized in such a way as to be intuitive, so as to contribute to the creation of a pleasing user experience (Ackerman, et al, 2006). Such formatting and organization must be considered in the core design of the webpage itself.

In more general terms, the design of the website must account for usability, which can be described as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” (Matera, N.D.). Usability partially encompasses many factors of a webpage’s design, such as page layout, navigation, aesthetics, and accessibility.

2.3.1: Page Layout

Page layout is one of the top priorities in terms of creating a user-friendly design for a website. Users must be able to understand how the contents of a page are organized

in order to become oriented with a site well enough to use it efficiently (Matera, N.D.). Following this, without an effective layout that allows for this quick orientation, a user may quickly become confused about how to proceed with their task. Thus, it is crucial to position, group, and populate elements appropriately in order to allow a user to interpret the structure of the page easily.

Statistics have shown that when users view a webpage they usually start at the top center and then follow a certain pattern down the rest of the page, with emphasis on the left side (Ackerman, et al, 2006). Knowing this, the most important elements of a page's design, such as navigational elements, should likely be placed as near to the top center or left side of the page as possible to facilitate easy discovery. A website that follows this design practice is illustrated in Figure 2.



Figure 2: The National Science Foundation website (<http://www.nsf.gov/>)

In addition to the position, the alignment of elements is also important. If there are too many alignment changes between elements, such as in Figure 3, a site may become harder to navigate due to a constant search to find the information needed. Figure 3 also shows a site where important information is aligned towards the right, which goes against the previous concept.



Figure 3: The Better Business Bureau of Western Virginia website (<http://vawest.bbb.org/>)

Also, the most important information must be readily visible in the first screen the visitor sees upon loading the page, without scrolling (Neiderst, 2001). The pages shown in Figures 2 and 3 both seem to follow this standard, as the main navigation and informational elements are visible in the first screen full.

Both Figures 2 and 3 have grouped their elements well, or in other words the screen can be cut into “areas”, each with their own purpose. Each does it in a unique way, however. Figure 2 illustrates a more typical example of website grouping, where navigation links are grouped across the top and side edges, with main information contained in a central column. Figure 3 shows a much more asymmetrical approach, splitting the screen into very distinct areas based on related informational content (not merely by navigation VS information).

2.3.2: Navigation

Often web users find it difficult to locate the information they require on a given site. This can usually be attributed to the lack of effective navigation within a site. This is especially apparent in pages that contain a very large amount of information as, without

effective navigation aids, a user can quickly become lost or frustrated. For this reason, it is advisable for a web designer to follow published guidelines to produce a site that is easily navigable.

The inclusion of effective navigational elements will increase the ease with which a visitor can find what they came to the website for (Chisholm, et al, 2001). Such elements include now common-place design pieces like a navigation bar directly across the top of the page underneath the banner, with additional links within a left column. An example of this can be seen on Boston's own site in Figure 1. There are also some more uncommon types of navigational elements that are very useful when implemented correctly.

One example of such an element is a drop-down or slide-out menu, in which hovering over a single link displays a list of sub-links. This type of navigation is great when space is limited, but a large amount of information that can be split into concise groups needs to be accessible (Palmer, 2002). The one downfall of this style is that those additional links are hidden from view until the user hovers over the triggering link. Thus, this must be used with care, and the titles or decoration of such triggering links must make it apparent that there are more links to be found by using it.

Another type of uncommon navigation that helps users in the case of a website with a very deep hierarchy is the use of a "breadcrumb trail" (Lida, 2003). This is an area, usually at or near the top of the page, which chronologically organizes the pages a user has travelled through to get to their current page. The content of a typical trail of breadcrumbs is usually formatted like this:

Home Page >> Subsection >> Subpage

In this element, each of the titles is a link back to that page. This allows a user to navigate back multiple levels at a time with one click, rather than repeatedly clicking their browser's back button.

2.3.3: Aesthetics

The aesthetics of a website are one of the very first things a user consciously comes to notice, and as such, it can provide an opportunity to make a good first impression on visitors to the page. In fact, this aspect of a website can cause a user to leave a site before exploring. Overall, the design of a website will determine if an individual feels that the site is worth taking the time to browse (Eccher, et al, 2004).

The basis of an aesthetically pleasing website is a good layout, as described earlier, but there are other factors such as the colors used throughout and their combinations. By the user's perception, bright and saturated colors are more exciting and dynamic, whereas darker and less saturated colors are interpreted as more serious and professional (Lidwell, 2003). In addition, there exist certain colors or color combinations that, when used in excess, can irritate the user's eyes or make content hard to read. This is often a result of combining too many saturated colors in close proximity, causing the users' eyes to get tired faster (Lidwell, 2003).

Another aesthetic choice that is important to the user is font style and size used in links and text. If a font is too small or stylized, it will decrease not only the readability, but also possibly the perception of professionalism inherent to the website. In a study it was found that among the top 8 web-safe fonts, size 12 Verdana text was tied for the fastest readability, second in perceived legibility, and a close third in attractiveness. Size 10 Verdana was also found to be the most preferred font styling (Chaparro, 2002). With this data, it seems that a combination of size 12 and 10 Verdana font styles would be most optimal for a webpage.

2.3.4: Accessibility

A webpage that is well laid-out, with good navigation and visual aspects is nearly worthless if that page is not easily accessible to those who want to use it. There are many factors that affect how a visitor accesses a website. These include personal disabilities and the software or hardware of the system they are using to surf the internet.

As far as disabilities go, the user may have lost one or more of their senses or possess a mental disability both of which may make it difficult to make use of site's features (Chisholm, et al, 2001). Regardless of the visitor's capabilities, each user might

employ a different web browser running on different operating systems, each of which might access and render the site's code markup in a different way. Also, the actual hardware used might be different; the screen may be much smaller (as on a mobile phone) or there may not even be a keyboard or mouse. As a last example, some potential users may speak a different native language than that spoken by the website's creators. Without translations, they might be completely cut off from the informational content or features of a site.

For each of these potential issues, there are standards and technologies that can help ensure relative accessibility for all users over a variety of conditions. For example, providing alternative text descriptions of imagery relays the meaning of such images to users who may have lost their sight. Also, testing the website markup across several browsers and hardware sets during development can ensure that the website always appears in a consistent, but usable, form under a variety of software and hardware conditions. It is important to take measures such as these in order to allow access to the website for all those who wish to use it.

2.3.5: Usability

A key feature of modern web sites is their increased level of usability, achieved by incorporating improvements in web design as well as new web technologies. Increases in website usability maintain user loyalty and help to attract more constituents. In the past, such issues of web design were not as important, but the rapid evolution, growth, and integration of the internet have brought them to the forefront. Before the use of the internet became an integral part of society, its usability was measured by: the consistency of the interface, response time, mapping and metaphors, interaction styles, and multimedia and audiovisual (Palmer, 2002).

- Consistency of the interface highlights the need for website navigational tools, such as buttons and bars.
- Response time is the promptness of response to user activity.
- Mapping and metaphors are the implementation of metaphors to aid user activity and navigation, such as shopping carts for online stores.

- Interaction styles centers on the response messages of the website, due to user activity, and multimedia concentrates on how such features can be implemented into the system design (Palmer, 2002).

Since the internet has become more prevalent in recent times, the metrics for usability have changed to additionally encompass the ideas of navigation, credibility, and content.

- Navigation, as described earlier, deals with the methods a user can employ to find specific information contained within a web site's pages
- Credibility encompasses the level of reliability for truthful information
- Content is simply the information shown and its relevance to the user's interests

Thus, for CityofBoston.gov, these metrics propose user-friendly navigation, frequent website updates, fast speed download times, and significant, high-quality, reliable content for its citizens (Palmer, 2002). These, along with more specific guidelines that have been developed, are being implemented to improve the general usefulness for all users.

A feature which can increase usability that many website are beginning to employ is the idea of a mashup. A mashup is the creation of a new service through the combination of one or more information sources, in order to enhance the user's experience (Crupi, 2008). For example, if the city of Boston was going to hold an event at a specific location, they might post this information in blog form and show the location of the event using Google maps. This would be considered a mashup because there is a combination of two technologies (blogs and Google maps), to simplify the experience for the user. This simplification of the user's experience results in an increase in usability. This includes the improvement of mapping, metaphors, and interactions styles. It also reduces the need for additional navigational elements to obtain the same group of information.

By paying attention to these main factors during the design phase of web development, a generally improved and more user-engaging final product can be created.

2.4: Web 2.0 and E-government

The term Web 2.0 was first coined by O'Reilly (2004). For O'Reilly, "Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform" (O'Reilly, 2006). He later elaborates that Web 2.0 is the software of the future and that it is a model for web design, with the purpose of maximizing the satisfaction of its users. According to him, "2.0" represents the comeback of the internet after the bursting of the dot-com bubble in 2001 (O'Reilly, 2005). Although O'Reilly defined the term, Web 2.0 is more often considered to be a buzzword used simply for marketing purposes, rather than a term restricted in its meaning by one definition. Some see Web 2.0 as the democratization of the internet, meaning it is an online revolution in which its users are taking control of its content (Beer & Burrows, 2007). Most importantly, while Web 1.0 concentrated on commerce, Web 2.0 focuses mostly on the user (Barsky & Purdon, 2006).

Some applications of Web 2.0 are blogs, wikis, RSS feeds, and social networks. A blog is an online diary or news column on a user's personal home page, which creates a sense of personality and diversity on the internet (O'Reilly, 2005). A wiki introduces new means of finding and exchanging information through collaborative information modification software. An example of a wiki is the extremely popular Wikipedia, which is a free and multilingual encyclopedia composed by users around the world. Wikipedia functions under social bookmarking tools, which catalog resources by user-defined keywords or tags. As a result, resources can be shared and easily distributed on Wikipedia (Barsky and Purdon, 2006). Really Simple Syndication (RSS) feeds provide users with website updates, without requiring the users to actually visit it. Lastly, a social network is an online community which allows members to develop relationships with others in their respective community (Barsky and Purdon, 2006). These applications were developed to fulfill the core concepts of Web 2.0, which are to provide user-created, user-friendly, and easily accessible content (Alexander, 2006). These concepts are related in the sense that they can be simultaneously achieved by engaging the user.

2.4.1: Increasing Civic Engagement with Web 2.0

As mentioned before, civic engagement is one of the primary goals of e-government websites. A Web 2.0 based website has the ability to enhance user interaction with user-oriented and user-controlled features. Hence, a Web 2.0 based e-government website can increase civic engagement by allowing citizens to become more proactive online.

2.4.1.1: Identifying Proactive Users

One study in the UK about Web 2.0 usage determined that there are four distinct types of proactive users (Osimo, 2008):

1. Producing content
2. Providing ratings, reviews
3. Using user-generated content
4. Providing attention, taste data

About half of Europe's population was considered in the study, since they were regarded as Internet users. The percentage of each type of proactive Internet users in Europe can be seen in Figure 4.

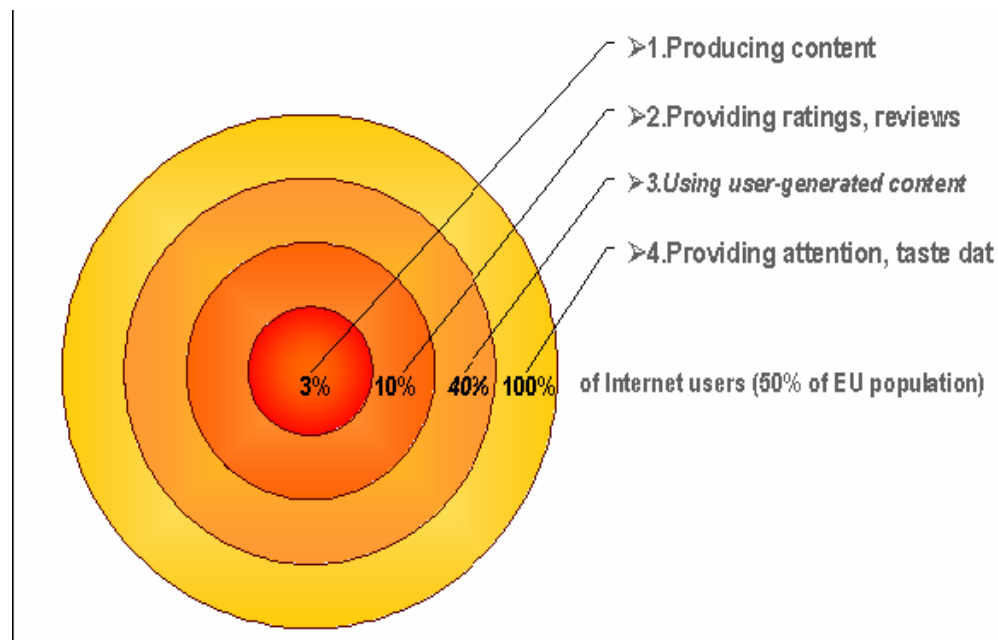


Figure 4: Percentage of each type of proactive users in EU (Osimo, 2008).

The innermost circle in the figure represents about 3% of users in Europe, who actually create content such as blogs and Wikipedia articles on Web 2.0 websites. It has been proven that this user-generated content is generally produced by young, tech-savvy individuals. The next circle is the 10% of European proactive users who critique user-generated content with comments, reviews, or feedback. The third circle corresponds to the 40% that utilize the user-generated content of Web 2.0 sites. Although these users are not directly affecting the content by producing or critiquing it, they are using such content to help make their own decisions. For example, these users may look at other people's ratings of movies before deciding which movie to see. The outermost circle is associated with 100% of internet users, who may not necessarily utilize Web 2.0 content, but indirectly offer information to alter such content. In other words, if an individual on Amazon.com purchases a product without using any Web 2.0 feature (i.e. reviews), their statistic of purchasing the product is compiled by the website, which then affects those who use such features.

It is important to identify these four types of proactive users, so that a more effective Web 2.0 based e-government website can be built. Since Web 2.0 technologies are so user-oriented, different features that cater to different types of users must be offered by the website. For example, a citizen who produces content would need a feature such as a blog in which they could post articles about issues they feel are significant. Citizens who provide reviews would need a feature such as a comment box, in which they can express their opinions about user generated-content. Lastly, the usability and accessibility of the site must be adequate enough to satisfy the needs of citizens who make use of and indirectly affect the content.

2.4.1.2: Potential Risks of User-generated Content

Unfortunately, there are a few risks with allowing the user to create or modify content in a website. These risks can be identified as:

- Low or restricted participation
- Diminished quality
- Malicious actions

The user-oriented features of Web 2.0 such as blogs and wikis compel the users to participate in the development of the website by manually creating its content. This poses a risk because user participation is not always guaranteed and it may not always be consistent, meaning that the production of content varies daily. On top of that, user participation is usually restricted to the tech-savvy, culturally and economically elite individuals. Another risk can be the diminished quality of user-created content since many of the users may not be experts in the field that they elaborate about. Lastly, malicious actions by users, such as the manipulation of content can be another serious risk. For example in a wiki, a purely collaborative online tool, where any user can modify the content in any posted article. This gives the opportunity for individuals to deface, falsify, or negatively alter articles (Denoyer & Gallinari, 2006). Although these risks cannot totally be avoided, they can be properly managed.

2.4.1.3: Managing User-generated Content

In order to manage the risks of user-generated content, some specific measures need to be taken. For example, to avoid low or restricted user participation, web developers must make certain that knowledge of the technology behind a given website feature is not necessary to use it. If a feature is easy to use and the public has enough interest in using it, then an adequate amount of participation can be expected. Rating systems can be implemented on a site to avoid the tapering of content quality. For example, if numerous users rate certain content poorly because they feel it is not useful, then that content could be eliminated by the administrators. Another means to protect the quality of content is to divide user and official (scholarly) content on the website, so that users are clear that the given content is user-generated and may not be totally accurate. A references section for each article created by users could also be useful in protecting the quality, because this provides the users with other sources to support the provided information. To manage malicious actions by users, filters could be used to ensure that newly generated content is reviewed or edited for profanity or anything else offensive before it is posted for users to view. In the case of polls, users can be restricted to casting only one vote in order to obtain the best feedback.

2.4.2: Improving Accessibility with Web 2.0

Increased accessibility of the Web correlates directly with the implementation of Web 2.0 features. In an effort to make the Web more accessible for the disabled, the Web Accessibility Initiative (WAI) was launched by the World Wide Web Consortium (W3C) in April 1997. The W3C decided to begin this project because the world is becoming more connected via the internet, and it is necessary that the Web is usable by anyone, regardless of their capabilities and disabilities. A series of website accessibility guidelines have been published by the WAI since its commencement (Chisholm, et al, 2001). Many government websites, especially those in the United Kingdom, are employing navigational tools to help those with disabilities and the elderly access information online. For example, those who cannot read regular sized font can conveniently increase the font size of the content with the push of a button. Although CityofBoston.gov allows users to change its font size, additional improvements can greatly increase the user satisfaction of the disabled and elderly in Boston.

2.4.2.1: Balance between Advanced Web 2.0 Tools and Accessibility

Although the technologically advanced features of Web 2.0 may provide freedom and convenience to “able-bodied” users, it can simultaneously hinder the accessibility levels for disabled users. Although the Web Content Accessibility Guidelines proposed by the W3C have effectively addressed most accessibility issues, new and emerging Web 2.0 applications are becoming too advanced for the current assistive technologies. Assistive technologies are mechanisms which aid the disabled to access certain features on websites. As the interactions with Web 2.0 applications become more complex, the user interfaces of Web 2.0 based websites become increasingly more interactive. For example, RSS feeds which provide real-time updates of websites to users are not always noticed by assistive technologies. Thus, the disabled user is not notified of changes like a user without disabilities would. The disabled or elderly users who are able to visually interact with the website may also eventually become confused or overwhelmed by the complicated physical interactions of Web 2.0 features (Gibson, 2007). As a consequence, while the plan is to produce a more dynamic CityofBoston.gov with beneficial Web 2.0 features, we must find a balance between the new technology and accessibility.

2.5: Strategic Planning for E-government

Why did we improve this website? What were the possible objectives of the project? What were the benefits of this project? How did we measure what we accomplished? Questions like these were what helped us define a project and begin the planning process. Each one of these questions needed to be answered in order for a well-structured and appropriate plan to be formed. “Begin with the end in mind” and “when applied to the Web design process, we gained a roadmap to our desired results and a clear vision of success.” (Costello, N.D.) In other words, knowing one’s destination was essential in order to plan accordingly.

After we realized the problem and goal of the project, there were a few other generic steps to consider in creating an effective strategic plan. With such a foundation, it was necessary to begin brainstorming important aspects of the problem which needed to be explored in depth. Next, these aspects were critiqued and prioritized (qualitatively and or quantitatively) in order of importance to the attainment of an acceptable outcome. Finally, with this list in mind it was possible to move forward in the formalization of the plan in order to successfully reach the goal. The following subsections provide details into specific aspects relevant to municipality websites, such as CityofBoston.gov. We considered these during the development of our own strategic plan.

2.5.1: Planning for User Content

When implementing a blog or any other Web 2.0 feature promoting user input and or user content, web designers must take into consideration how to go about regulating content posted by users (Perlmutter, et al, 2005). This would require special attention in the case of municipal websites, which should maintain a professional appearance (thus requiring regulation/removal of offensive content), but at the same time also maintain an open forum for citizens to engage in enriching discussion and commentary. Finding a balance between regulation of content and free speech is a high priority for a government website. If citizens feel like they are being censored, there may be a public backlash against the site; on the contrary, if the regulation is too relaxed they may doubt the professional level of the website. In either case, users may be driven away from the site, having an impact on the level of community interaction within and surrounding the site.

There are several ways such moderation can be achieved, one of which is having one or more moderators actively monitoring content submitted by users. While this strategy would safeguard against most explicit content, it would require constant attention from the Web staff, which can be costly in both time and money. Another form of filtering out unwanted information would be with an automated system. Such a system could be set up to censor vulgar words or phrases or other generally offensive content, in order to automatically and systematically minimize the level of manual maintenance and attention required. The problem with such an approach is that there are technical ways for mischievous individuals to bypass many implementations of this type of system.

2.5.2: Considering the Audience

Determining the general audience is an important step in the planning process. Because a government website is used to provide services and information to its citizens within the city, it is generally accessed by a wide array of people. These users range from students to the elderly and it is important to cater to their different needs, so that every user is satisfied. Studies have shown that younger users typically enjoy a website with lots of user interactivity, such as messaging, downloading, and other Web 2.0 features, than the elderly (Teo et al, 2003). For the disabled, certain additional accessibility needs would have to be considered. Ideally, a government website would incorporate a balance of accessibility and visual appeal, enabling it to be enjoyed and accessible to a wide variety of individuals.

To get a view of the demographics and opinions of the users of CityofBoston.gov, we knew we had to conduct a survey. This survey would contain questions about user opinion on various aspects of the current website, its functionality, what they might like to see added/improved, and basic demographic questions. From this survey we would be able to move forward with suggesting improvements the users wanted. Automated tools exist to measure some of the factors we would be asking users about, but getting real user feedback is crucial to the overall process of analyzing the level of interaction and responsiveness inherent to the site (Palmer, 2002).

In attempting to make the website friendly for all users, it is important to consider what will frustrate users and what information they will be able to access. These two

things can be measured through the use of metrics. Metrics are methods such as link count and graphics count which allow designers to analyze aspects of their site such as page composition and formatting (Ivory, 2001). Metrics, like link count, allow designers to determine how effective the layout of their site is. On the other hand, graphics count makes it possible to predict how long a page will take to download, and therefore, how likely users are to become frustrated with the site.

2.5.3: Design with Popular Aspects in Mind

In order to facilitate the efficient placement and access of content, or the functionality a user desires, the website design should provide for the most common tasks to be accomplished, with the fewest number of clicks or page changes (Ackermann, et al., 2006). Therefore, those aspects of the website that are barely used, or which ultimately cause users to leave the website entirely, should be obscured to whatever degree necessary to facilitate the location and navigation of those popular elements. By keeping this in mind, the usability of the web site will be improved, ultimately enhancing user loyalty to the site.

One avenue in determining the most frequently or rarely used sections of a webpage is through Google Analytics. This online service keeps track of webpage visitor data such as: which pages are viewed the most, the least, how often, as well as how long they are each accessed. Through the analysis of this vast resource of site-specific data, it is possible to design appropriate changes to a website template that bring popular features to the forefront of the user's view. This would achieve the desired effect of reducing the number of clicks required to access such pages as described previously.

On a related matter, if the goal is to encourage user engagement through new interactive features, these elements must be incorporated in such a way that they become readily apparent to new and experienced users alike. If user-interactive features are not brought forth, the likelihood of rich and diverse civic engagement is significantly diminished.

2.5.4: Benefits of Strategic Planning

Through the execution of the strategic planning process it becomes easier to organize the various tasks associated with website development and maintenance, as well as visualize their relationships (Clyde, 2000). In addition to providing a level of organization of important factors in the development process, this can increase the likelihood of a successful outcome, as it encourages thinking about all the possible implications of each development decision. This line of thinking can uncover both potential pitfalls before they occur and new ideas that had not been previously considered. These pieces of information, once formulated in a strategic plan, can aid in moving forward towards the stated goal in the most efficient manner.

2.6: Conclusion

Many have said that the Web has been evolving in multiple ways. The driving forces behind this evolution are new technologies that have been grouped together under the title “Web 2.0”. This evolution has left many web developers curious as to how these new features can improve or retain the appeal of their sites to their users. One such developer that had taken an interest into the use of these technologies and standards was the City of Boston MIS Department, which runs CityofBoston.gov. In this chapter we discussed topics such as the purpose of government websites in society, web 2.0 as a whole, strategic planning, web design issues, and brief case studies of similar sites. This collection of information gave us a starting point and the insight to be able to look ahead to plan out how to achieve the project goal.

With this starting point in mind, we have derived a set of 3 objectives that we aim to fulfill during our time in Boston:

- Subjective Evaluation of Current CityofBoston.gov Website
- Objective Evaluation of Current CityofBoston.gov Website
- Development of Visual Template for New CityofBoston.gov Website

The first objective emerged from the realization that we first needed to identify the end users’ opinions of the current site in terms of its aesthetics as well as its functionality. This was in order to allow us to begin determining areas where the users would like to see the site improved or

changed. In the second objective, we wanted to complement this subjective analysis of the website with an objective analysis, through the use of metrics and various validation tools which provide consistent results without bias. This complementing process not only would allow us to potentially uncover other areas of potential improvement, but we realized it should back up the somewhat opinionated data from the subjective analysis with computed data. During the final objective, we planned to develop and then evaluate a new proposed visual template for CityOfBoston.gov. This template was to include improvements based off of the findings of the previous two objectives, while adhering to web design guidelines and standards discovered during our research.

3.0 Methodology

This project sought to create a more interactive and user-friendly city website, which would assist with the City's broader goal of civic engagement through the web. Using online evaluation tools and feedback from a survey, we evaluated the CityofBoston.gov website and created a template. This *Methodology* section explains in greater detail how we accomplished these tasks through three core objectives. Each objective described below is introduced, and then followed by the hybrid (qualitative and/or quantitative) data that was needed in order to accomplish the goal. We believed that hybrid data was the most effective choice because not only did it contain numerical statistics, but also the needs or desires of the users via feedback. This section explains how the necessary data was gathered.

3.1: Objective One – Subjective Evaluation of Current CityofBoston.gov Website

The subjective evaluation of CityofBoston.gov encompassed the opinions and feedback of its users. This data helped us to determine what aspects of the site users would like to see changed and what elements of the site did not need any alterations. To gather this data, the survey asked for user input regarding navigation, layout, aesthetics, accessibility, and usability. Questions such as how easy was it for you to find city news, how would you rate the overall color scheme of the website, and how likely would you be to participate in an online poll if given the opportunity, were asked in order to gather user feedback on all aspects of the site (see Appendix B-1 for the complete survey).

This data was gathered with an online survey, which was created on KwikSurveys.com. Kwik Survey, unlike some of the other online survey sites, allowed us to create multiple surveys with any number of questions for free. This made it possible for us to produce the type of survey that we wanted without any restrictions. Additionally, this survey website restricted each user to participate only once which made it possible for us to avoid some forms of response bias. It was also able to automatically compile completed survey data for us to analyze.

After we completed the survey, we made multiple revisions based on feedback provided from our sponsors in Boston's MIS Department. Once our survey alterations were finished, the link to the survey was posted on the City's website, the City of Boston Facebook group, and the

City of Boston Cable YouTube fan page. The large amount of traffic and the wide variety of visitors to these sites allowed us to collect a wide range of data.

After we finished collecting survey responses, we exported the data into Excel in order to look at the data more closely and to produce graphs. We first calculated the average response for each survey question so that we were able to see what users on average thought of the site. We then calculated the correlation between respondent age and questions to determine if there was a relationship between user and site preferences. These two computations helped us to identify a general opinion as well as look at the individual opinions of users of certain demographics. In addition to the calculations performed in Excel, open-ended questions, such as how do you think the website could be improved, provided respondents with a place to give us feedback that we may not have considered otherwise.

By studying the data and feedback gathered from our survey, it was possible for us to determine the general user population's desires and opinions of the current site and what changes it could benefit from in the future.

3.2: Objective Two – Objective Evaluation of Current CityofBoston.gov Website

After obtaining the preferences of website users, we examined the website using objective methods to determine accessibility issues, color combinations, and the like. This enabled us to examine the CityofBoston.gov in comparison to other e-government websites, as well as what W3C standards were not being met in Boston's website.

3.2.1: Reference Points

In order to compare CityofBoston.gov to other e-government websites, it was first necessary for us to decide which websites were good representations of what our project aimed to accomplish. It was important for us to find examples of government websites that performed well in the web design characteristics that we were studying such as layout, accessibility, usability, and the features that they provided to users. Using some of the same analysis techniques on the reference points and the current websites allowed us

to establish positive and negative features of CityofBoston.gov, as well as possible additions for the site.

To determine our reference points, San Diego (<http://www.sandiego.gov>) and Denver (<http://www.denvergov.org>), we reviewed case studies from our Background. These case studies provided information, such as disability access, public outreach and electronic services, on successful e-government websites in major U.S. cities. For example, one of the case studies ranked several U.S. city e-government websites by their accessibility, usability, and foreign language access. We utilized the top two websites from this case study, San Diego and Denver, as our reference points for developing an improved CityofBoston.gov template (West, 2004).

3.2.2: Metrics

After we established that San Diego and Denver are good representations of e-government websites, we determined a set of metrics for comparing certain aspects of CityofBoston.gov to those of our reference points. Using a previous study of web metrics, the metrics that we chose were: link count, graphics count, and page size (Ivory, 2001). These metrics showed us how efficiently the website was laid out, as well as provided us with an estimate of how long it might take for the page to download. Both of these were important characteristics to consider when evaluating the website because they presented us with ways that we could have improved the website when we developed the new template.

3.2.2.1: Link Count

The metrics that involved link count allowed us to determine how effective the layout of the current CityofBoston.gov website was. Ultimately, the links on a page are what allows the user to explore a site. This means that more links provide users with more opportunities to find the information that they are attempting to access on a website. For this reason, the first metric that we utilized was the total number of links on the homepage. To measure this, we counted the number of links on the three homepages of Boston, San Diego, and Denver.

In addition to counting the total number of links, it was important for us to consider certain characteristics about the links, such as uniqueness, repetition, and location. The first aspect that we examined was link repetition on each of the homepages. Because users have different techniques for finding information on a website, it is important to have some repetition amongst links so that users can find their information from more than one location. In order to measure link repetition, we needed to count the number of recurring links, or the number of different pages that could be accessed from the homepage. In other words, it was necessary for us to determine which links brought users to the same pages. Because of the large number of links on the homepages, the best way for us to determine which links were repeated was to record the different pages that could be accessed through links. To do this, we clicked on each link and copied the page URLs into an Excel sheet. From there, it was possible for us to filter the URLs that were the same and count the number of links that were repeated.

In conjunction with the number of recurring links, we were able to determine the number of unique links. While it is important to have some repetition of links, it is of equal importance that the number of unique links be large because it allows users to access a wide variety of different pages from the homepage. Essentially, the number of unique links is the opposite of the number of repeated links. Because we had already determined the total number of links and the number of recurring links, we calculated the number of unique links by subtracting the number of repeated links from the total number of links.

The final link metric that we utilized was the number of links visible on the homepage without scrolling. As suggested by our research in section 2.3.1, users typically do not like to scroll to find the information that they are looking for. For this reason, the number of links visible without scrolling should be substantial so that the number of pages that can be accessed by users who do not scroll down the page is large. To determine the number of links visible without scrolling on each of the three homepages, it was first necessary to determine what screen resolution was for the typical user because this would affect the number of visible links. We found this information through the use of the MIS department's Google Analytics account. By setting our own screen resolutions to the most common screen resolution of CityofBoston.gov visitors,

we were able to view the website in the same way that the standard user does. Similar to the way that we counted the total number of links, we then counted the number of links visible without scrolling on the homepages of Boston, San Diego, and Denver. This helped us to determine efficient means of providing users with an effective layout that did not clutter the page.

3.2.2.2: Graphics Count and Total Size

After we considered the number and different types of links on the homepage, the next metrics that we used were graphics count and total size of the webpage. Graphics count is the number of images on the page, whereas total size is the total bytes of the website. It was important for us to consider these two factors because they both correspond to the download time of the website. Given that larger pages take longer to download, it is imperative that the size of a webpage not be too large. Otherwise, as our research indicated, users may become frustrated and leave the website without finding the information they came to the website for.

Because graphics can range from space holders used for formatting to large pictures, it would have been difficult to count images in the same way that we counted the number of links. Thus, to determine both of these metrics, we utilized a toolbar created by Firefox called Web Developer 1.1.6. This tool provided us not only with the number of images, but also what the images were and their size. This enabled us to see what images were very large and could possibly be eliminated when creating the template. Additionally, the toolbar allowed us to look at the total size of the homepages, thus making it possible to compare CityofBoston.gov with our two reference points.

These metrics provided us with an organized and consistent means of evaluation that allowed us to determine how effective the layout of current CityofBoston.gov was and how it compared to our reference points.

3.2.3: Google Analytics

Once our metrics were completed, there were still several things that were essential for us to know in order to create a successful template. We produced the following two questions that still needed to be answered:

- What screen sizes should we consider in the creation of our template?
- What pages should we make more accessible in the template?

To help us answer these questions, we used the MIS department's Google Analytics account. Fundamental information such as the most popular pages on the site and the average time that the users spend of the site were accessible to us through Google Analytics.

In addition to how a user accesses the site, the size of a user's screen also plays a role in the overall usability of the site. For this reason, to make our template easy to use for visitors to CityofBoston.gov, it was important that we know what screen sizes were being used most frequently by visitors to the website. Through Google Analytics we were able to find the most common screen resolutions.. These made it possible for us to determine the best size for our template because they allowed us to view our template from the perspective of a typical user.

When creating our template, it was important for us to determine which links were not being utilized to their full extent and thus which links needed to be moved around. To identify these aspects, we answered our second question through the combination of survey feedback and Google Analytics data. Google Analytics provided us with the top pages visited by users from the homepage. By merging this with the information that users said they had a difficult time finding in our survey, we were able to determine what pages users wanted to visit and what important information was currently difficult to locate. These two things made it possible for us to decide what pages should be easiest to access in our template.

3.2.4: Online Validation Tools

Finally, we evaluated the accessibility and the usability of the site using online validation tools. We chose a total of three online evaluation tools from a long list that

was proposed by the W3C. The list by the W3C provided a large group of possible web accessibility validation tools. For this reason, it was necessary for us to look through the all the possible tools and decide which tools would be most useful to us. To do this, we first went through and grouped the tools into two categories: color and accessibility. We then filtered through the tools in each category to determine which tools suited our needs the best. The tools that were most relevant to what we wanted to assess were: AccessColor, EveryEye, and Truwex 2.0.

The first tool, AccessColor, has the ability to assess color dynamics such as color contrast and brightness. This tool made it possible for us to determine whether the colors of the website affected the readability of the text. This was important because if users have a difficult time reading the content of the website the site becomes almost useless to the visitors. In order to test for consistency, we also checked the color contrast of the website on the Truwex 2.0 tool. While Truwex 2.0 was mainly used for accessibility issues, it also checked for color contrast and brightness so we were able to compare the results of the two tools to make sure that the same errors were reported.

In addition to studying the color contrast of the website, we also wanted to test how the website appeared to people whose vision is declining. The EveryEye tool can display the effects of decaying eye sight by showing how the website would appear to users of different ages.

Lastly, we also measured the accessibility of the website through the results that we received from the Truwex 2.0 tool. This tool provided us with instances of the website that failed to adhere to W3C standards. In particular, Truwex 2.0 checks for compliance with Web Content Accessibility Guidelines (WCAG), as well as the Section 508 disabilities act. For example, if there was an image that did not have alternate text to make the website accessible for blind users, the Truwex 2.0 tool provided us with the image and which guideline was not being followed.

3.3: Objective Three – Development of Template for New CityofBoston.gov Website

The purpose of this objective was to create a template for purposes of aiding in a new design as well as comparison to the original webpage. The creation of the template consisted of

general web design principle-related changes as well as the incorporation of beneficial Web 2.0 features into the layout. The comparison of the template with the original website was an important step as it provided an assessment of the successes and or failures of our changes to the website template. Without this final objective, it would not have been easy to determine the real-world quality and visual appeal of the template; the only knowledge would have been how well it adhered to the principles found in our research. As such, this objective enabled us to deliver a quality product to our sponsor, along with a set of data to help support the claims of the beneficial improvements included therein.

In order to begin laying out the purely visual version of the template, we first had to determine which changes were advantageous or desired. This set came from the results of our survey, in addition to our use of validation tools and metrics, which we used to analyze the site. This data was collected and examined in order to determine what to consider during the creation process. The data that was gathered from our metrics provided us with both positive and negative attributes of the navigation on the homepage. By comparing these with our reference point metrics, we were able to produce possible solutions to the existing problems and identify aspects that should not be changed. From our survey, users presented us with aspects that they found difficult and useful, along with possible additions to consider. This feedback gave us more information to consider in the development of our template.

Finally, validation tools conveyed which W3C guidelines the website was not adhering to, and thus, we ensured that our template met the accessibility guidelines that were not previously being met. In addition to using the data that was gathered in our first two objectives to create the template, the key web design principles that we had found in our research played a crucial role in the development of our template because they provided us with a strong background in good web design. With these considerations complete, it was easier to create a modified template that was tailored to the required specifications.

From our data, not only did we learn what problems the public experienced with existing features, but we also determined what attributes, particularly Web 2.0, the citizens thought would be useful if integrated into the website design. Through our own research, our reference points, and citizen feedback on the surveys, we were able to compile a list of possible Web 2.0 applications that could be valuable to users if included in CityofBoston.gov. After we determined what features website users thought would be beneficial, it was necessary for us to differentiate

between Web 2.0 features that would be positive additions to the website and those that would not be of great use to website visitors. In order to do this, we analyzed the features based on how effective they would be if incorporated into CityofBoston.gov by determining whether they would improve or worsen the usability and civic engagement of Boston citizens. The features that we categorized as beneficial were then taken into consideration in the development of our template.

After taking all of this information into consideration, the actual visual representation was created using Adobe Photoshop, employing several layers (overlapping but separate workspaces). This was done to facilitate the separation of specific images and content, should the MIS Department choose to use only certain elements of our work on their live website. Once the visual template was complete in Adobe Photoshop, the template was coded, resulting in an actual, functional webpage. This coded version consisted of the homepage, as well as seven subpages: Online Services, Government, Businesses, Students, Visitors, Residents, and Contact Us, and each of these subpages incorporated the features and aspects that we determined to be valuable for the website. All links to any other pages lead back to the corresponding page on the current CityofBoston.gov website.

In order to complete the comparison of the template and original webpage, we used the same evaluation tools and performed the same metrics that were done on the original site. This allowed us to ensure that our template followed the W3C guidelines and implemented a more effective layout.

4.0 Findings and Discussion

In order to reach our goal, we gathered our results to make changes about the aesthetics, navigation, and accessibility of CityofBoston.gov. It was essential that we change the overall color scheme of CityofBoston.gov to increase contrast between the text and background, in order to comply with online validation tools and public opinion. We concluded that it was necessary to slightly increase the text size because we were able to find a balance between the findings in our research and the results from our survey. The implementation of drop down menus for convenient navigation was needed because of our reference points, metrics, and survey feedback. The reference points as well as user feedback required us to change the layout of the website so that the most important sections are centralized, to reduce scrolling. We prepared recommendations on accessibility, such as foreign language options, because of our analysis of W3C standards and reference points. Another improvement on accessibility was that we reduced the amount of text that could not be reached by voice reader assistive tools. We also made Web 2.0 recommendations for a future CityofBoston.gov website, based on our survey results and reference points. This *Findings and Discussions* section describes how we derived these conclusions based on results from our previously stated objectives.

4.1: Current Website Evaluation

As mentioned in sections 3.1 and 3.2, we evaluated the current website via subjective and objective means. Both means, as well as some findings in the Literature Review were used to determine the following fundamental elements of a website: aesthetics, navigation, and accessibility.

4.1.1: Aesthetics

The aesthetics of a website represent its overall appeal. Aspects such as color scheme, text fonts and sizes, as well as layout are considered under aesthetics. As seen in Figure 5, it is evident that the respondents were clearly not satisfied with the appeal of CityofBoston.gov. About 60% of the individuals felt that the current appeal was either “Poor” or “Fair,” which is an overwhelming percentage of negative feedback. Because of

this, we realized that we had valid reason to make significant changes on the color scheme, text, and layout of the website.

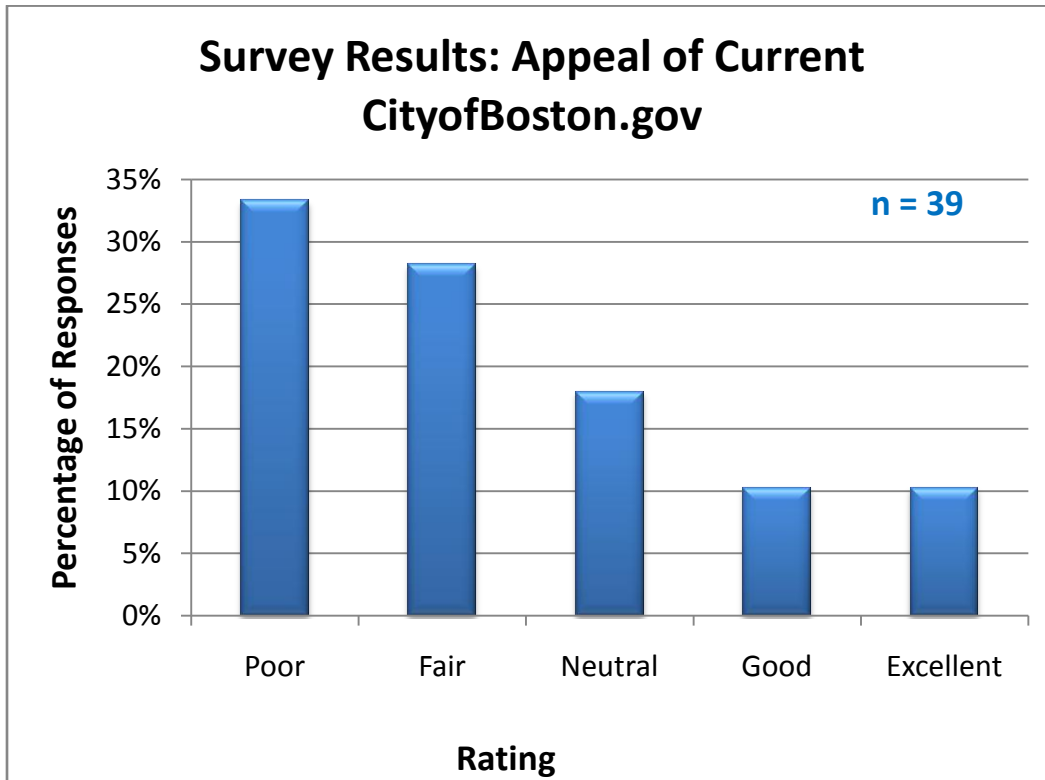


Figure 5: Bar graph of survey results: appeal.

4.1.1.1: Color Scheme

Based on the results from our online evaluation tool, AccessColor, it was necessary that we change the color scheme to improve the contrast of CityofBoston.gov. Figure 6 and 7 display the results of AccessColor on the website homepage. As mentioned in section 3.2.4, this tool measures the color brightness and contrast of a website. The red boxes on these results represent the failed color test portions, while the yellow boxes show the sections that have warnings. The red portions failed because of a lack of sufficient color brightness and contrast, while the yellow parts failed in either one of the two categories. Figure 8 shows the failed areas in color contrast on the current website using Truwex 2.0. This tool provided basically the same results as AccessColor, which was added substantiation for changes in color scheme.

Home Online Services Residents Business Visitors Students Government

Monday, April 6, 2009

Online Services >>

- Payments
- Forms, Permits & Applications
- Reports & Publications
- Job Postings

Contact Us >>

- Departments & Employees
- City Hall Hours & Directions
- Mayor's Online Constituent Service

City Departments >>

Select a Department

Most Requested Pages

- Property Tax Information
- Apply for a Job
- Maps
- Parking Ticket
- My Neighborhood
- Things to Do

Welcome

Register for Boston Shines, April 24th & 25th

This two day clean up event is part of the Mayor's year-round clean up and community service program, Boston Shines 365. Please bring out friends, family members and colleagues and join us as we prepare the City for Spring.

[Register >>](#)

Street Cleaning

Street cleaning has resumed early this year, and parking enforcement starts April 1. Sign up for email reminders to avoid ticketing and towing.

[Schedules and Notifications >>](#)

Report a Pothole

During the winter months, the freeze / thaw cycle can cause pavement to crack so that it deteriorates quickly under the weight of traffic. The Public Works Department relies on constituent reports to identify areas in need of repair.

[More Info >>](#)

Mayor's Youth Council Accepting Applications

Each spring, high school juniors and seniors from every neighborhood in the city are selected to serve as volunteer representatives, outreach to peers, advocate for youth issues and meet with city officials.

[BostonYouthZone.com/MYC >>](#)

Mayor Menino's Recovery Plan

Detailed information and financial figures on projects across Boston that will receive funding from the American Recovery and Reinvestment Act.

[www.cityofboston.gov/recovery >>](#)

Harbor Discoveries Camp

The City and the New England Aquarium join together to offer youth a unique opportunity to explore the fascinating world of water!

[Read More >>](#)

Search:

City Calendar >>

See a listing of City Events and Public Meetings.

[View Entire Calendar](#)

Mayor's Office >>

Thomas M. Menino, Mayor

- News & Press Releases
- Weekly Column
- Mayor's Priorities
- Mayor's Biography

City Council >>

- Councilor Biographies
- Schedule of meetings
- Districts
- Committees

News & Press Releases >>

- Boston Hosts Second Homeowner Foreclosure Prevention Workshop
- Mayor Menino hosts first ever

Figure 6: Results of AccessColor on top portion of CityofBoston.gov.

BAR
BOSTON AREA RESIDENTS

Find out how the City is delivering services to residents in these challenging economic times and view departmental performance measurement data which is used by the Menino Administration in making decisions about programs and expenditures.

[View Performance Reports >>](#)

[Press Release: Boston First to Unlock Such Detailed Data >>](#)

Residents >>

Comprehensive information about programs and services for residents.

- Housing & Property
- Neighborhoods
- Elections & Voting
- [View All >>](#)

Business >>

Resources for conducting business in and with the City.

- Starting a Business
- Licenses & Permits
- Economic Development
- [View All >>](#)

Visitors >>

Useful Information for planning a trip to Boston.

- About Boston
- Things to do in Boston
- Freedom Trail
- [View All >>](#)

Students >>

Information and services for students of all ages.

- Schools & Colleges
- High School Students
- Onein3Boston [>>](#)
- [View All >>](#)

Contact Info

Email Alert

Text Size: [A](#) [A](#) [A](#)

Boston

- BCYF INVITES BOSTON YOUTH TO SIGN UP FOR APRIL VACATION WEEK AND SPRING ACTIVITIES
- MAYOR MENINO TO OPEN GROVE HALL LIBRARY AND COMMUNITY CENTER SATURDAY
- [RSS](#)

Related Links

- The City of Boston on Facebook [>>](#)
Become a fan today!
- Mass.gov [>>](#)
Massachusetts State Government Web Site
- USA.gov [>>](#)
The U.S. Government's Official Web Portal
- Get Adobe Reader [>>](#)
Many forms are available in PDF format. To view and print in PDF format, you must download and install the reader
- [Get Adobe Reader](#)

Figure 7: Results of AccessColor on bottom portion of CityofBoston.gov.

Figure 8: Truwex 2.0: failed areas of color contrast in current website.

However, as shown in Figure 9, about 44% of individuals who took the survey felt that it was “Good” or “Excellent,” 18% were undecided, while 38% felt it was “Fair” or “Poor.” Thus, almost half of the respondents were satisfied with the color scheme, while the other half believed there was room for improvement. Unlike the results of AccessColor, we received both positive and negative feedback from the users.

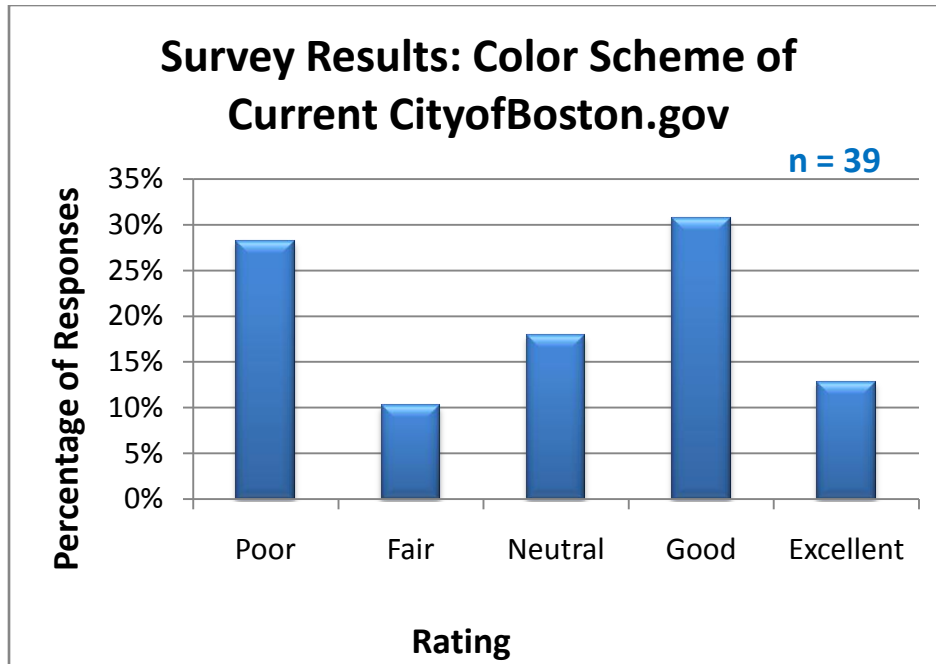


Figure 9: Bar graph of survey results: color scheme.

If we only considered the results of AccessColor, we would have had to drastically change the level of color contrast, since a significant portion of the website failed or had warnings. With this almost equal division of user feedback, combined with the results of AccessColor, we decided to change the color scheme only slightly on the template (meaning we kept most of the same colors, but made them higher in contrast). This way, we could please the users and comply with the online validation tool simultaneously. Our change in color scheme also concurred with research from section 2.3.3, which stated that less saturated and darker colors appear to be more professional.

As seen in Figure 10 and 11, the banner at the top of the template was changed to a darker blue than in the current website. This was done to complement the darker image that was used in the template.



Figure 10: Top banner on current website.



Figure 11: Top banner on template.

Figures 12 and 13 show how the left column of the template was made a darker blue than the current website, while the right column was made gray. This was done to help make the left column stand out more because it contains important information on website navigation (such as “Most Requested Pages”).

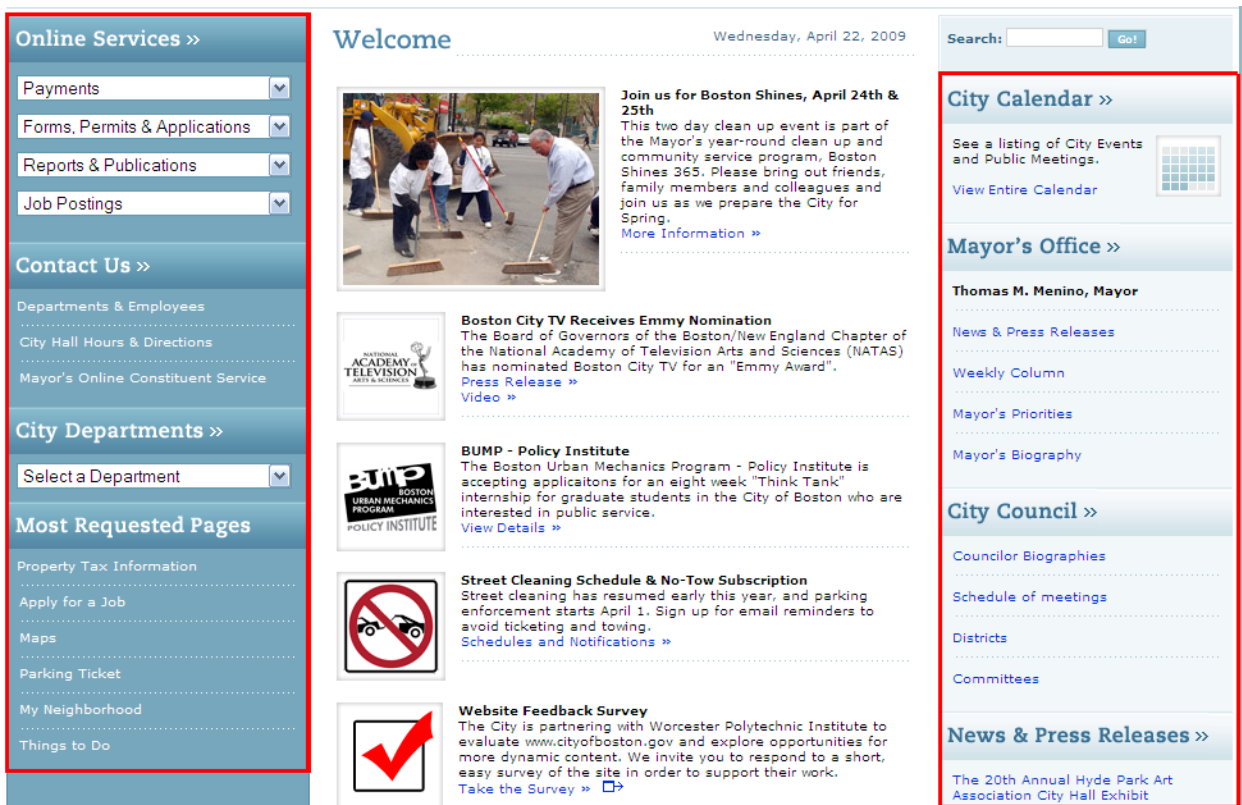


Figure 12: Left and right columns in current website.



Figure 13: Left and right columns in template.

The arrows in some of the titles in the left column of the template, as shown in Figure 14, were made yellow in order to pronounce the fact that these titles are links as well.

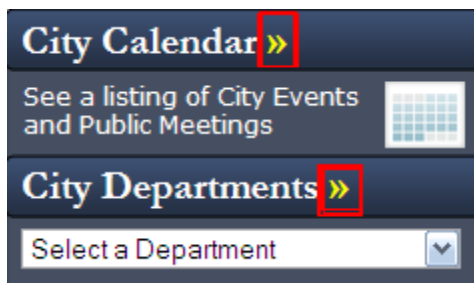


Figure 14: Yellow arrows signify titles as well as links.

Figures 15 and 16 display how the search engine was changed to a darker blue in the template, in order to create contrast with the adjacent navigational drop down menu under the banner.

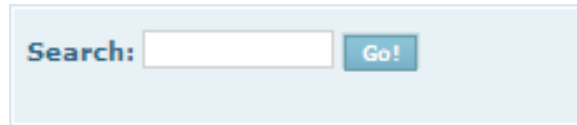


Figure 15: Search engine on current website.

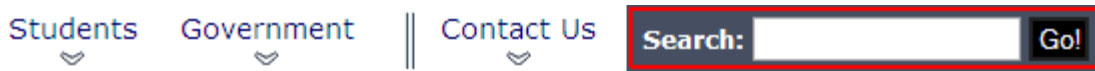


Figure 16: Search engine on template.

The color schemes of the subpages that are linked to the titles in the navigational drop down menu of the template were also darkened in order to create consistency throughout the website. As shown in Figures 17-22, the “Online Services,” “Government,” and “Contact Us” pages implemented the same dark blue color as the template homepage, because those current subpages use the same colors as the current homepage.



Figure 17: Online Services subpage on current website.

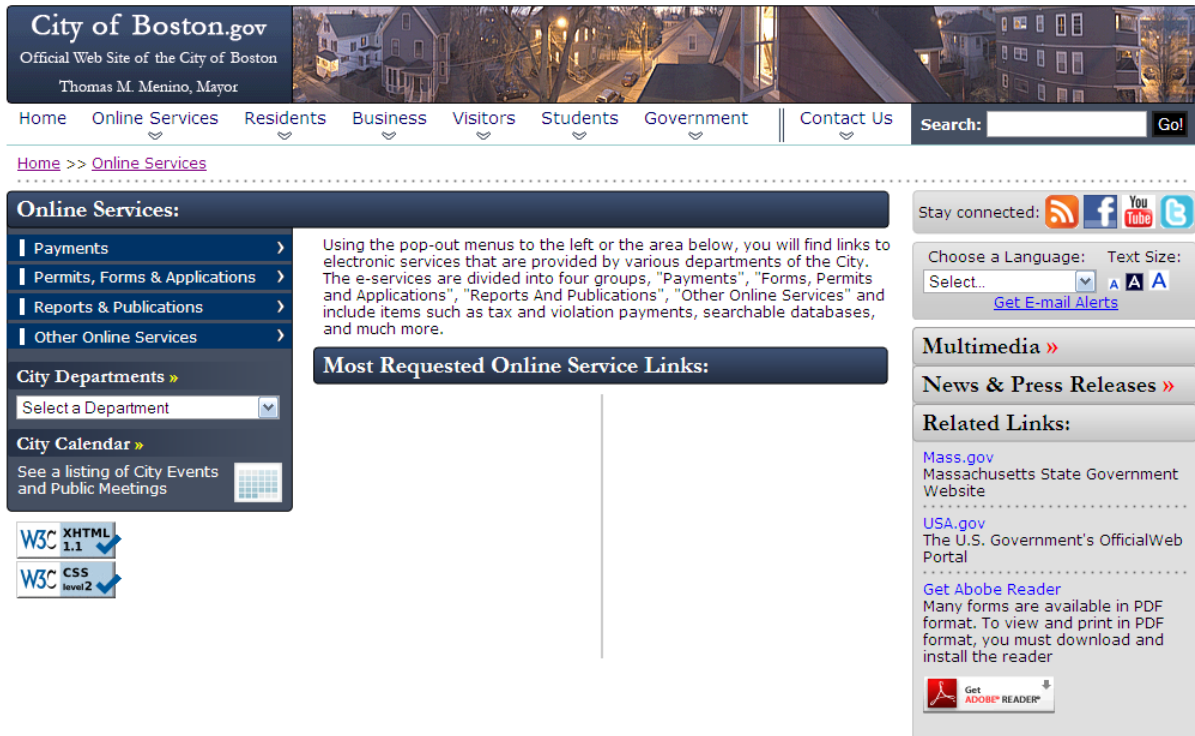


Figure 18: Online Services subpage on template.

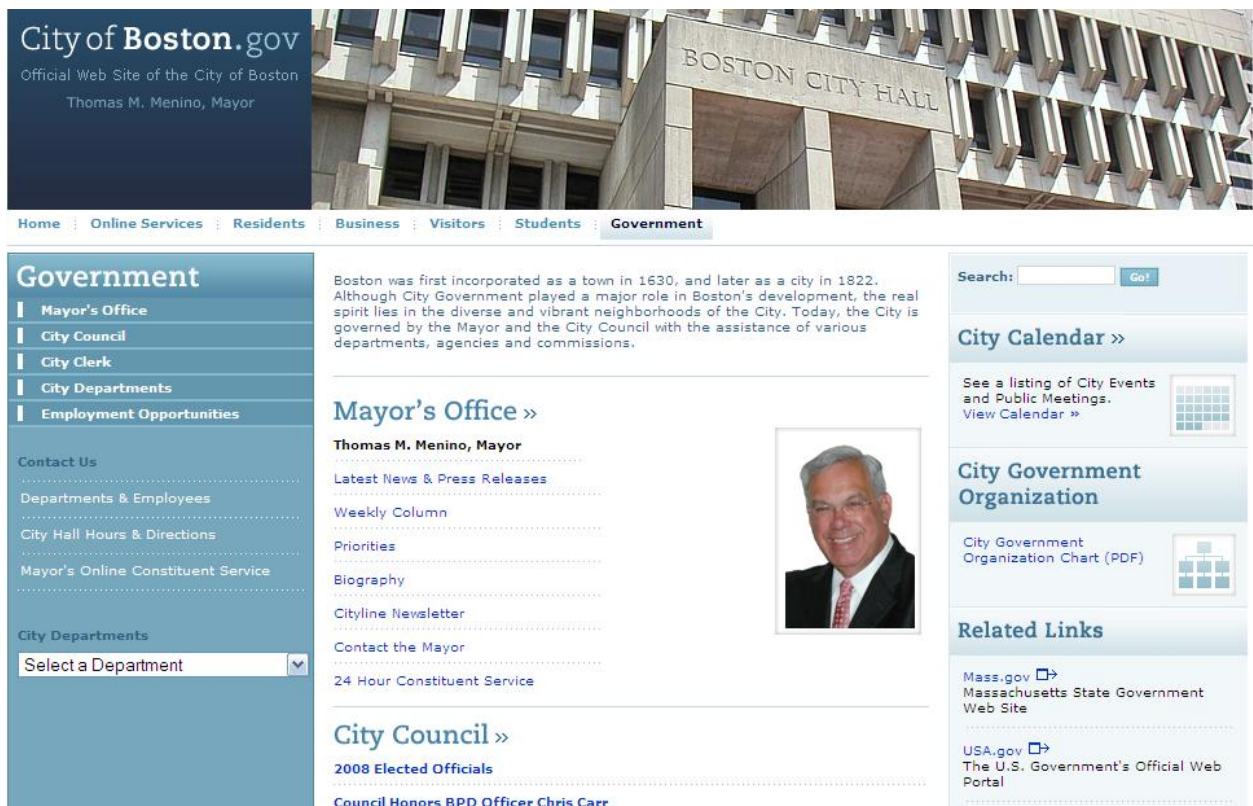


Figure 19: Government subpage on current website.

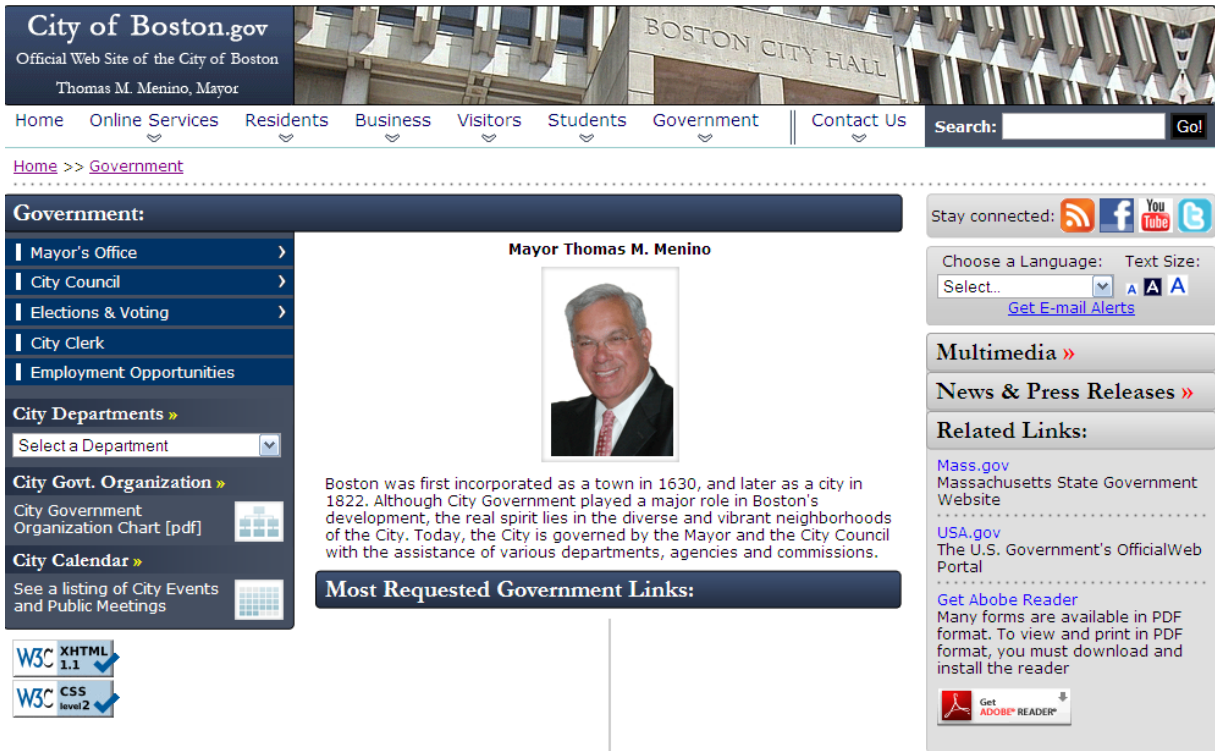


Figure 20: Government subpage on template.

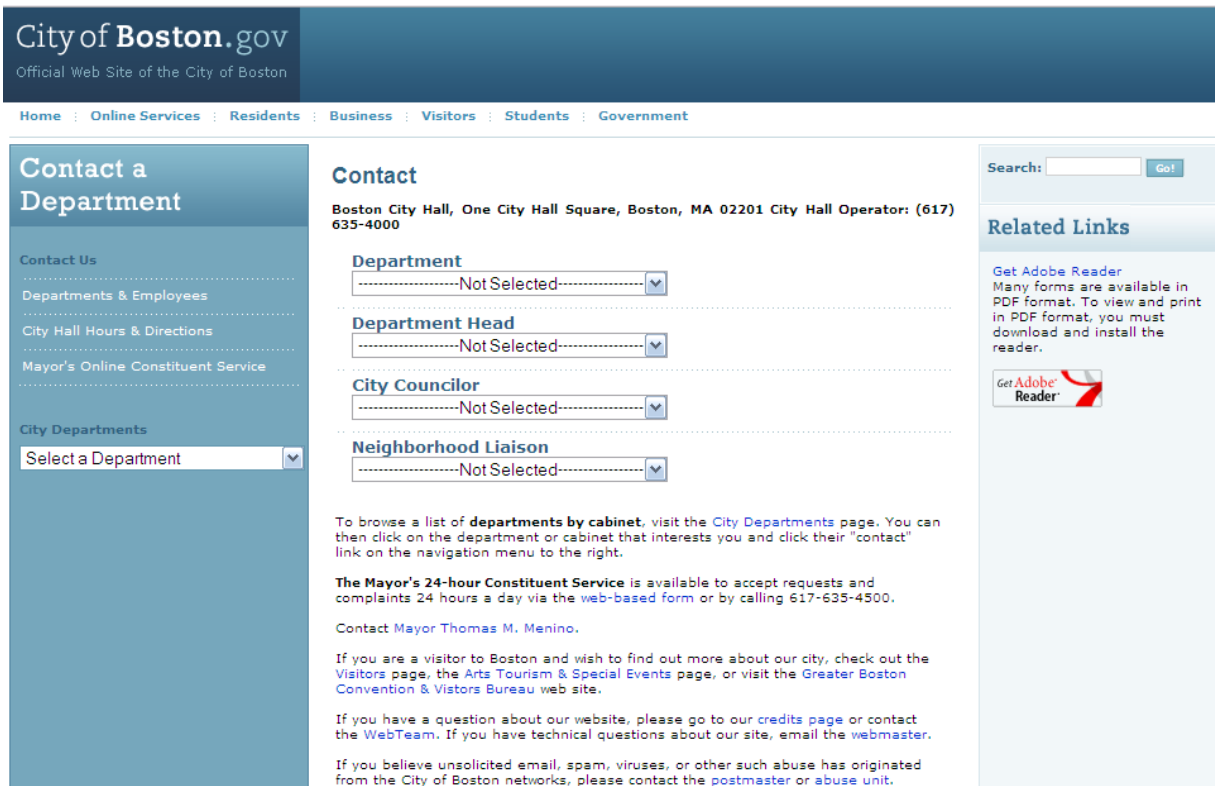


Figure 21: Contact subpage on current website.

City of Boston.gov
 Official Web Site of the City of Boston
 Thomas M. Menino, Mayor

Home Online Services Residents Business Visitors Students Government Contact Us Search: [] Go!

Home >> Contact

Contact A Department:

City Departments »
 Select a Department []

City Calendar »
 See a listing of City Events and Public Meetings []

W3C XHTML 1.1 []
 W3C CSS level 2 []

Boston City Hall, One City Hall Square, Boston, MA 02201 City Hall Operator: (617) 635-4000

DEPARTMENT
Not Selected..... []

DEPARTMENT HEAD
Not Selected..... []

CITY COUNCILOR
Not Selected..... []

NEIGHBORHOOD LIASON
Not Selected..... []

To browse a list of **departments by cabinet**, visit the [City Departments](#) page. You can then click on the department or cabinet that interests you and click their "contact" link on the navigation menu to the right.

The **Mayor's 24-hour Constituent Service** is available to accept requests and complaints 24 hours a day via the [web-based form](#) or by calling 617-635-4500.

Contact [Mayor Thomas M. Menino](#).

If you are a visitor to Boston and wish to find out more about our city, check out the [Visitors](#) page, the [Arts Tourism & Special Events](#) page, or visit the [Greater Boston Convention & Visitors Bureau](#) web site.

If you have a question about our website, please go to our [credits page](#) or

Stay connected: [] [] [] []

Choose a Language: [] Text Size: [] [] []
[Get E-mail Alerts](#)

Multimedia »

News & Press Releases »

Related Links:

[Mass.gov](#)
 Massachusetts State Government Website

[USA.gov](#)
 The U.S. Government's Official Web Portal

[Get Adobe Reader](#)
 Many forms are available in PDF format. To view and print in PDF format, you must download and install the reader

[Get ADOBE® READER®](#)

Figure 22: Contact subpage on template.

We changed the “Residents” and “Visitors” subpages on the template to have the same, but darker colors as the current website, as illustrated in Figures 23-26.

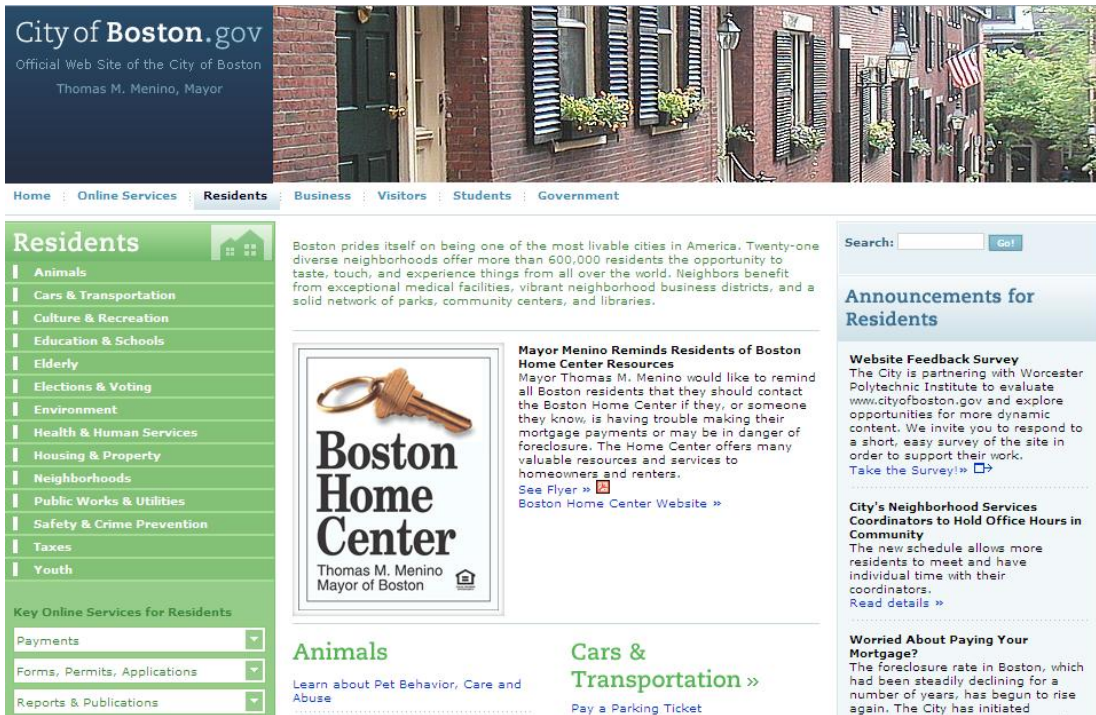


Figure 23: Residents subpage on current website.

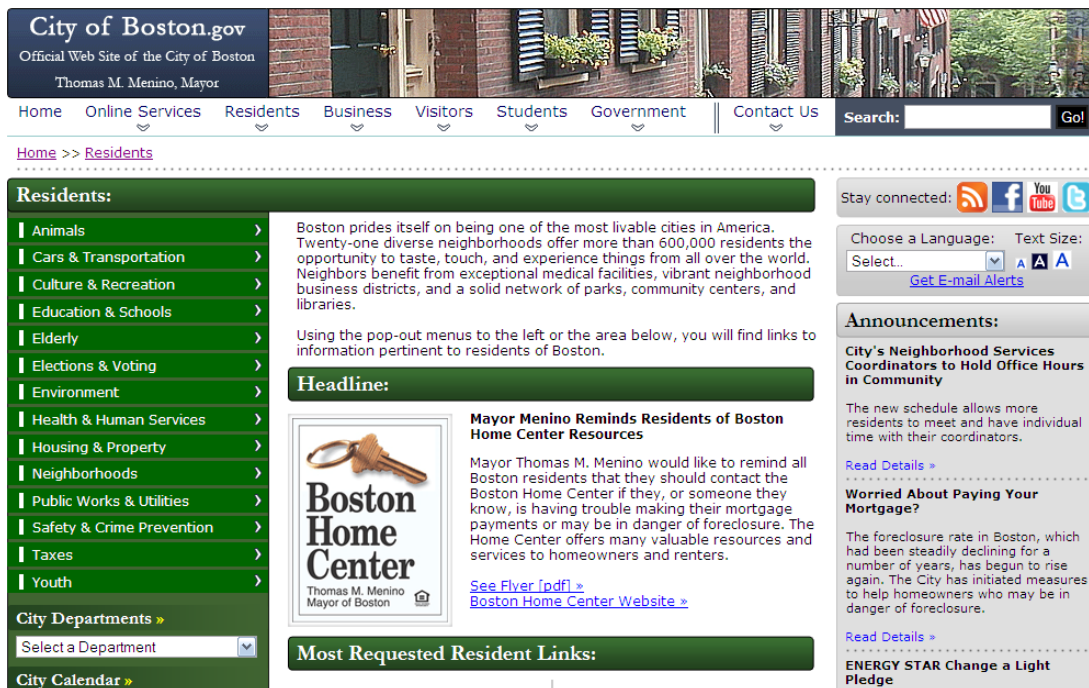


Figure 24: Residents subpage on template.



Figure 25: Visitors subpage on current website.

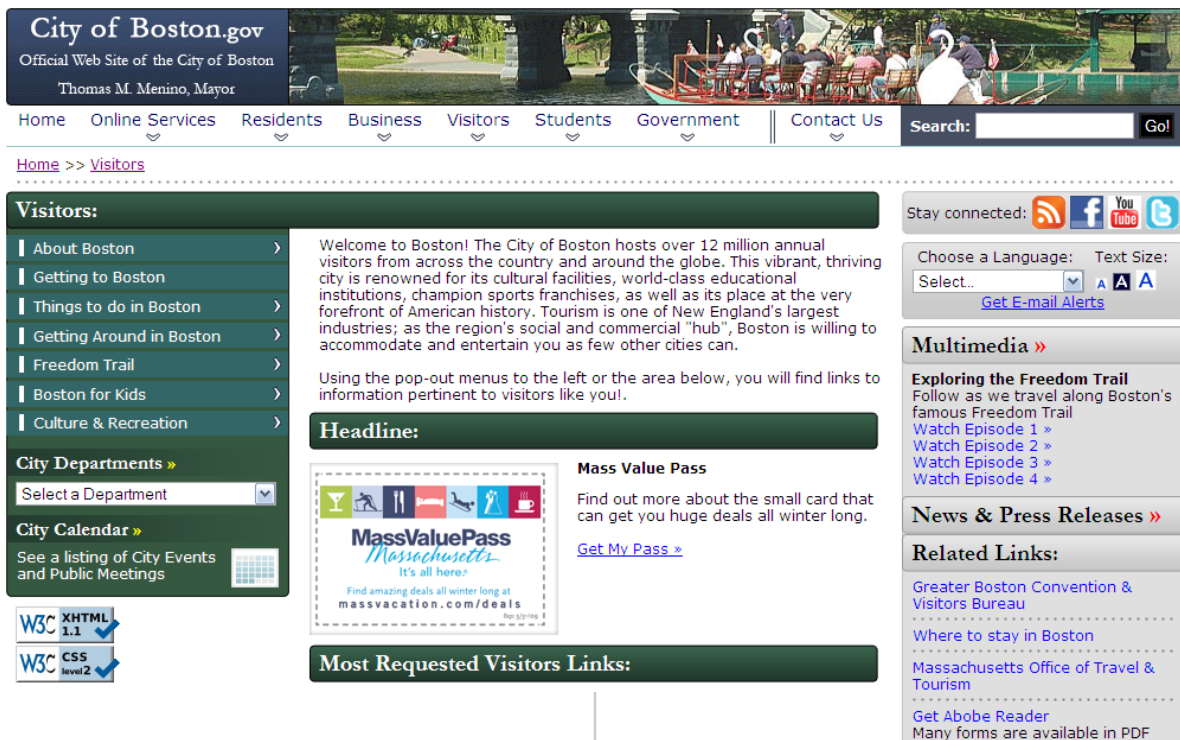


Figure 26: Visitors subpage on template.

As shown in Figures 27 and 28, the “Business” subpage on the template was changed to a dark red. The original subpage color was not darkened because we could not create enough contrast and it was aesthetically unappealing.



Figure 27: Business subpage on current website.

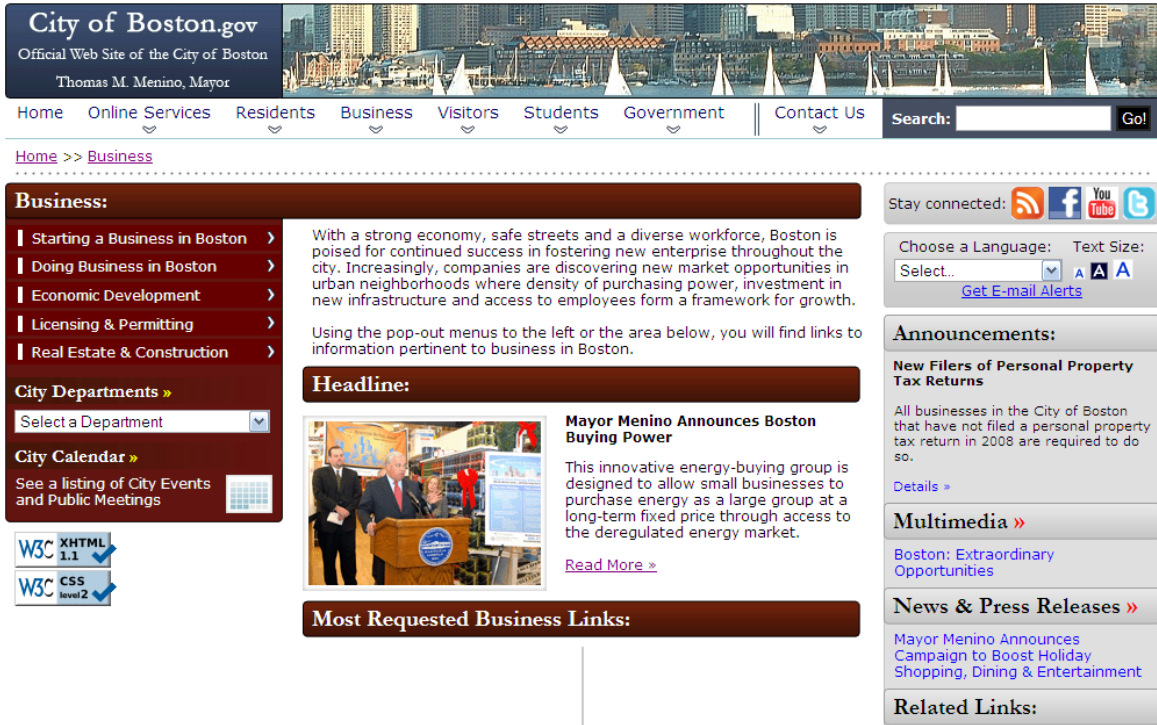


Figure 28: Business subpage on template.

4.1.1.2: Text

The current website uses 10 Verdana as the font of the body content. According to our survey results as shown in Figure 29, almost half of the respondents answered that the text color, size, and font were either “Good” or “Excellent,” while a little more than half answered “Neutral,” “Fair,” or “Poor.” The fact that more than half of the respondents were not satisfied with the text styles meant that we had reason to make some changes where necessary.

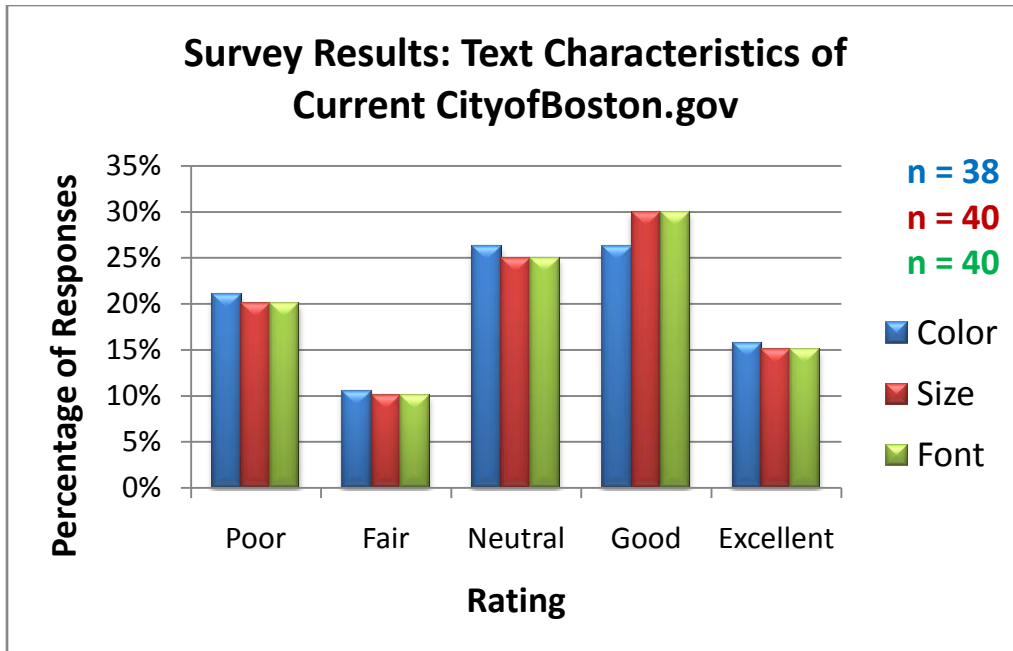


Figure 29: Bar graph of survey results: text.

On the template, we decided to keep the font as Verdana and the body content text color as black, but changed the text size to 12. We kept Verdana because as explained in section 2.3.3, it was ranked as one of the top 8 web-safe text fonts which increased readability, legibility, and attractiveness. We kept the color black because it contrasted well with the white background in the body. The text size was increased to 12 because we felt that it would benefit the users. Figures 30 and 31 display the change in text size between the current website and the template.



Figure 30: Size 10 text in body content of current website.



Register for Boston Shines, April 24th & 25th

This two day clean up event is part of the Mayor's year-round clean up and community service program, Boston Shines 365. Please bring out friends, family members and colleagues and join us as we prepare the City for Spring.

[Register »](#)

+ Comment

Figure 31: Size 12 text in body content of template.

4.1.1.3: Layout

The layout of a website represents the organization of its content. According to our survey results, the organization of CityofBoston.gov was not rated very well by its users. About 60% of the respondents believed that the organization was either “Poor” or “Fair,” as shown in Figure 32. This below average statistic showed that the layout of the website needed to be changed.

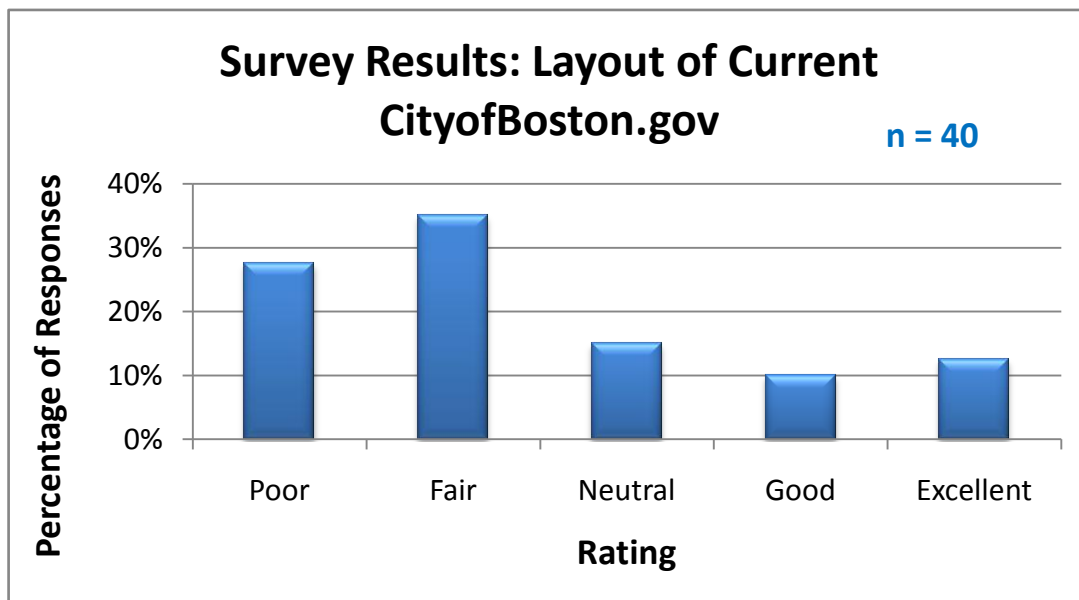


Figure 32: Bar graph of survey results: layout.

In addition to using our survey results, we also used the metrics that we performed to draw conclusions about the layout of CityofBoston.gov. The most important

metric to consider when looking at the layout was the number of link in the first screen full. Because users do not like to scroll, it is important to have the majority of the links on the first screen full. Since users visit the site from a variety of different screen resolutions, resulting in different initial views of the homepage, it was important for us to determine what resolution to use for our metric. Through Google Analytics, we learned that the most common used screen resolution was 1024 x 768 pixels. After setting our screen resolutions to that size and counting the links visible without scrolling, we found that Boston and Denver had similar results while San Diego was drastically different (full list of metrics can be seen in Appendix E). Of the 167 links on Boston's homepage, 69% of them were accessible to users without scrolling. On the other hand, only 22% of San Diego's 172 links were able to be seen. This large difference can be explained by the use of drop down menus that CityofBoston.gov utilizes and San Diego does not. For this reason, drop down menus were an important part of our template development and will be discussed further in later sections.

Using the feedback from our surveys and metrics, we decided to move content around the homepage in such a way that scrolling could be minimized (thus allowing more content to be seen on the first screen full). In order to do so, we moved the headlines in the middle of the current homepage closer together. This way, all of the headlines can still be seen, and at the same time less space on the homepage is used. The banner at the top of the page was minimized to consume less space as well. We moved the search bar directly next to the navigational bar, so that the alignment could be consistent. The "City Calendar" menu was moved from the top right, to the top left portion of the page, in order to make room for some new Web 2.0 features which will be discussed in depth later on. Lastly, the "Text Size," "Contact Info," and "E-mail Alerts" buttons were moved from the bottom left, to the top right of the template so that it could be more noticeable to users. All of these changes in layout can be seen in Figure 33.

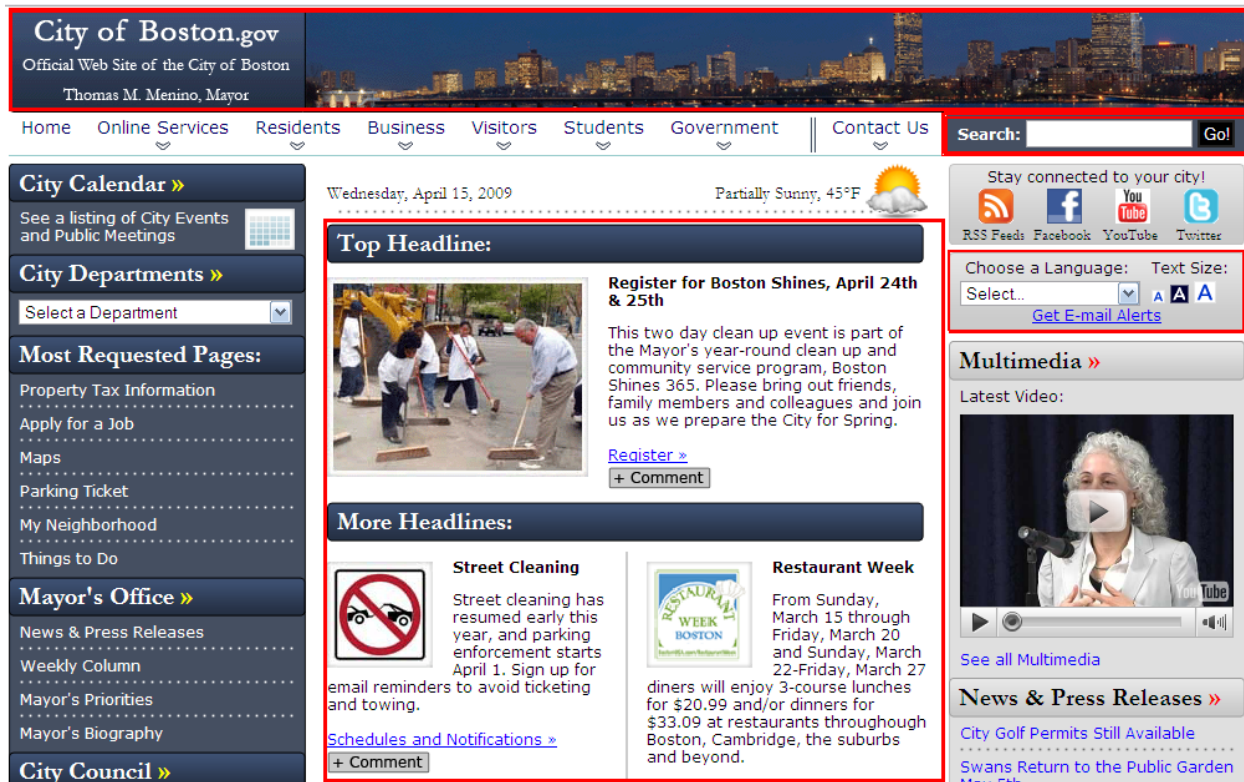


Figure 33: Changes in layout on template.

4.1.2: Navigation

The ease in which a user can move from one part of a site to another is considered navigation. As shown in Figure 34, about 45% of the respondents felt that the ability to move around the website was either “Poor” or “Fair.” This response, as well as the “Ease of finding information” part of Figure 34 illustrated that some drastic changes needed to be made in dealing with the navigational aspects of CityofBoston.gov. In terms of how easily information could be found, over 60% of users felt that it was “Poor” or “Fair.” This high percentage of negative feedback dealing with navigation showed that better means of moving about the website must be provided for the users.

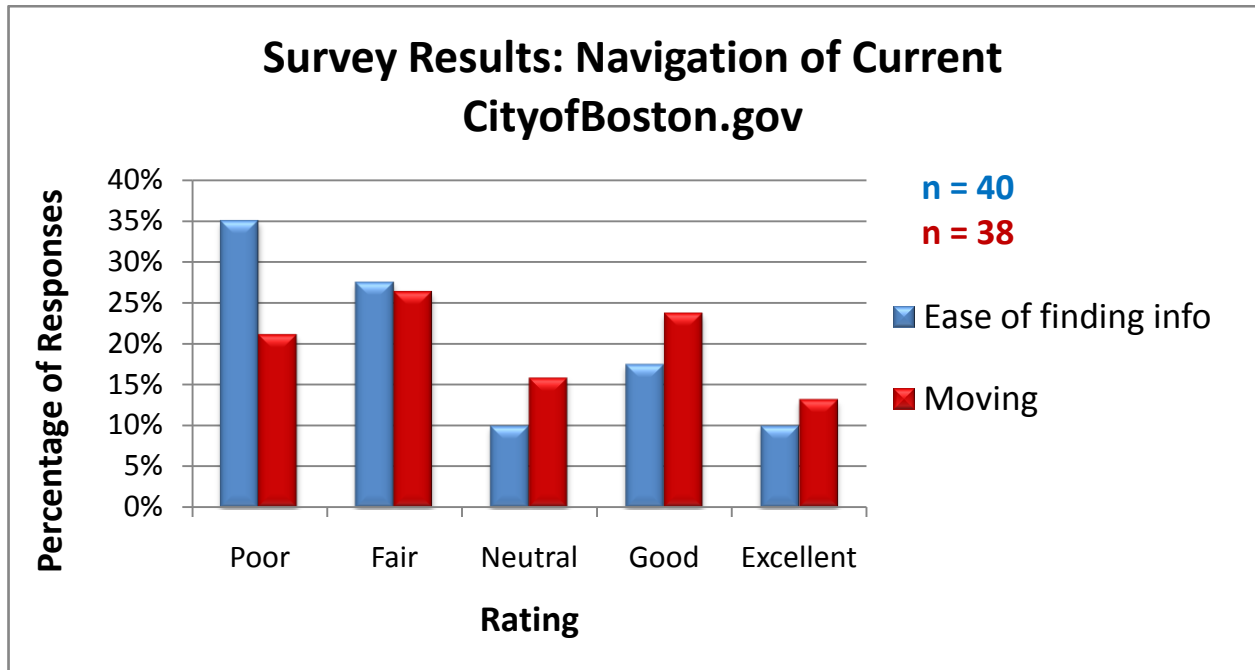


Figure 34: Results from survey: navigation.

In the current website, there are links to other parts of the website at the bottom of the page (see Figure 35). We decided to put these links in the navigation bar at the top of the page by implementing drop down menus, as shown in Figure 36. This way, the links to other parts of the webpage appear whenever a user scrolls over the different sections on the navigational bar. These links are also accessible from every subpage on the template, unlike in the current website where they are only available on the homepage. This change also improved the layout of the homepage since it reduced the amount of space used on the website.

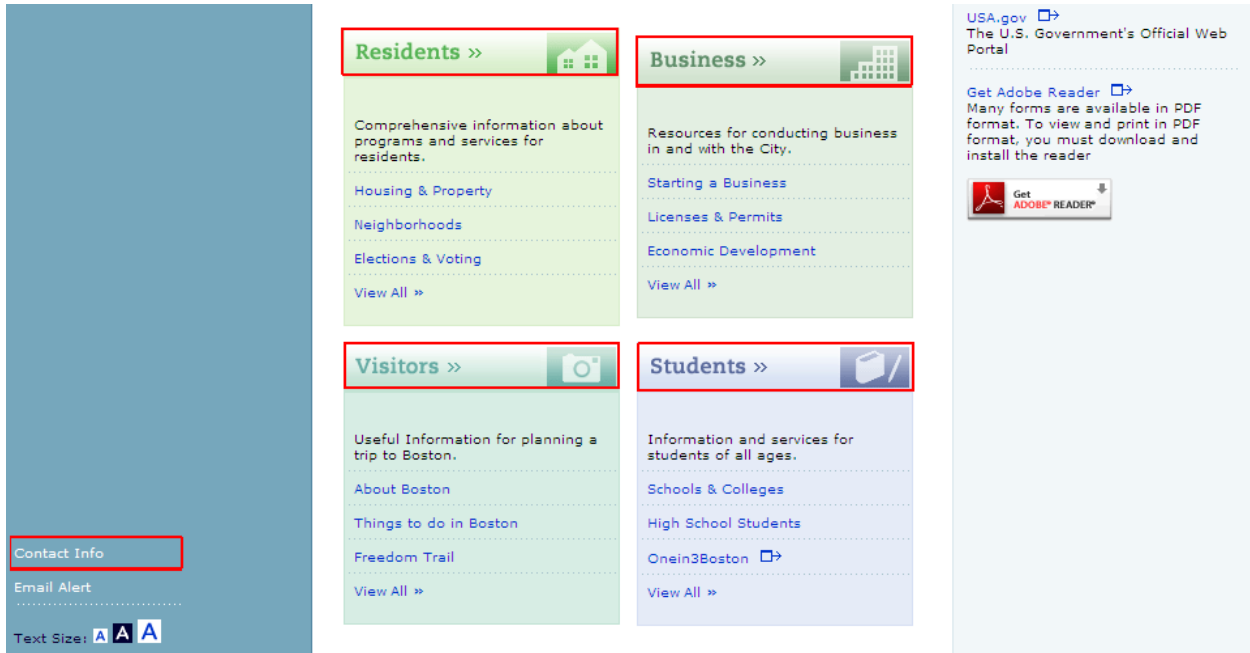


Figure 35: Links at bottom of current website.

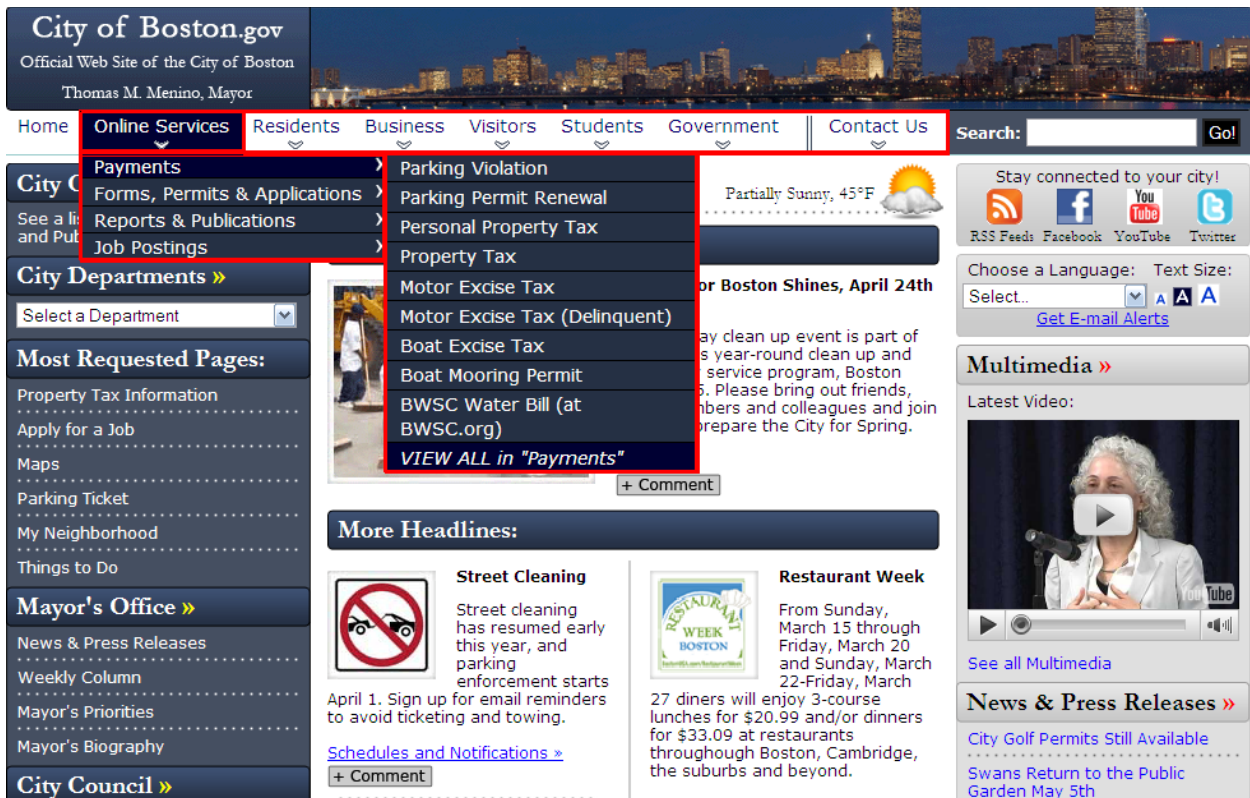


Figure 36: Implementation of drop down menus in template.

In addition to these changes, we also implemented breadcrumbs, which allow users to track their path of navigation throughout the site. Figure 36 displays a user who moved from the homepage to the “Online Services” subpage.

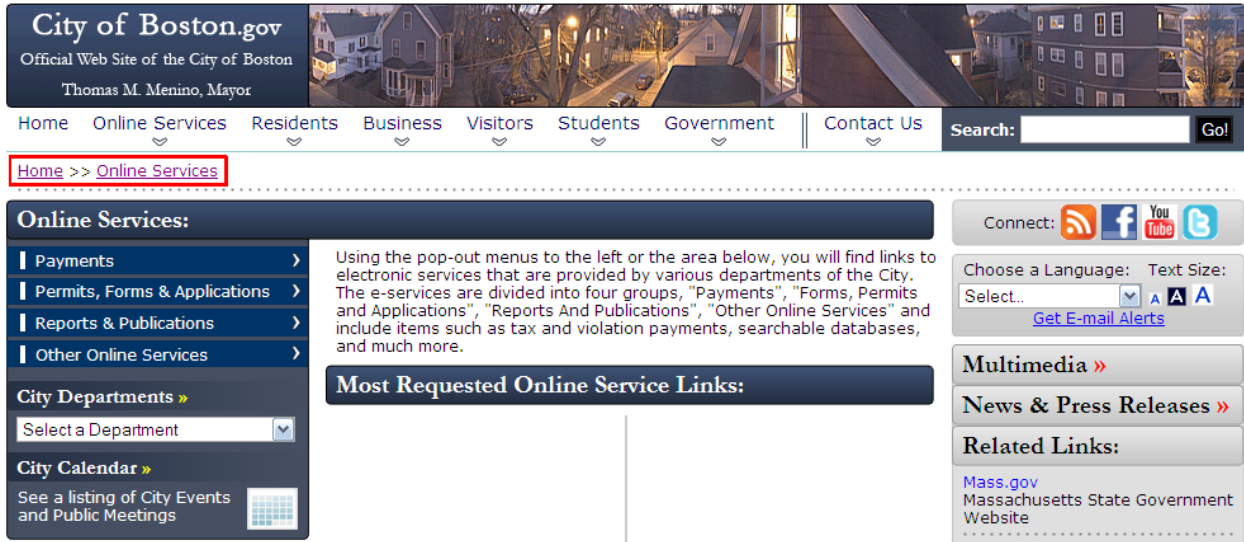


Figure 37: Example of breadcrumbs in template.

4.1.3: Accessibility

Accessibility is the ease in which users of all ages, disabilities, and cultural backgrounds can access a website. The results that we received from the online validation tool called EveryEye are shown in Figures 38 and 39.



Figure 38: View of CityofBoston.gov with normal vision.



Figure 39: EveryEye: view of CityofBoston.gov with vision at age 75.

We used an online validation tool called Truwx 2.0 as well and its results are shown in Figure 40. Figure 40 shows all of the areas where there is limited or no accessibility for voice reader assistive tools that are used to aid the blind.

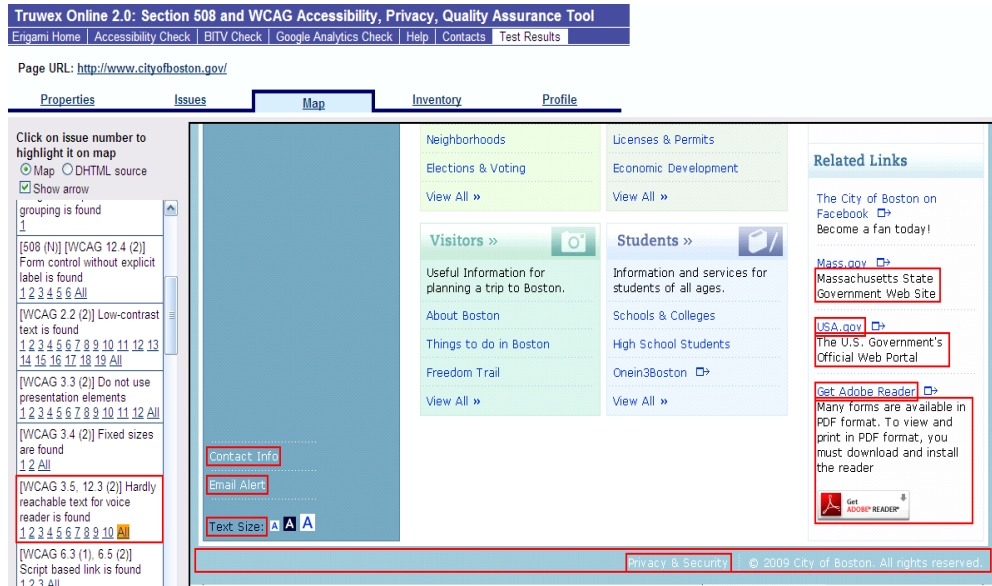


Figure 40: Results of Truwex 2.0: areas of low accessibility for voice reader assistive tools.

Because of the EveryEye and Truwex 2.0 tools, we decided to make some changes to increase accessibility. Since the increase in age drastically affected the clarity of the website, we decided to increase the size of the headings, as observed in Figure 41. We also decided to implement foreign language options on the template because of the W3C guidelines that we found in our research.

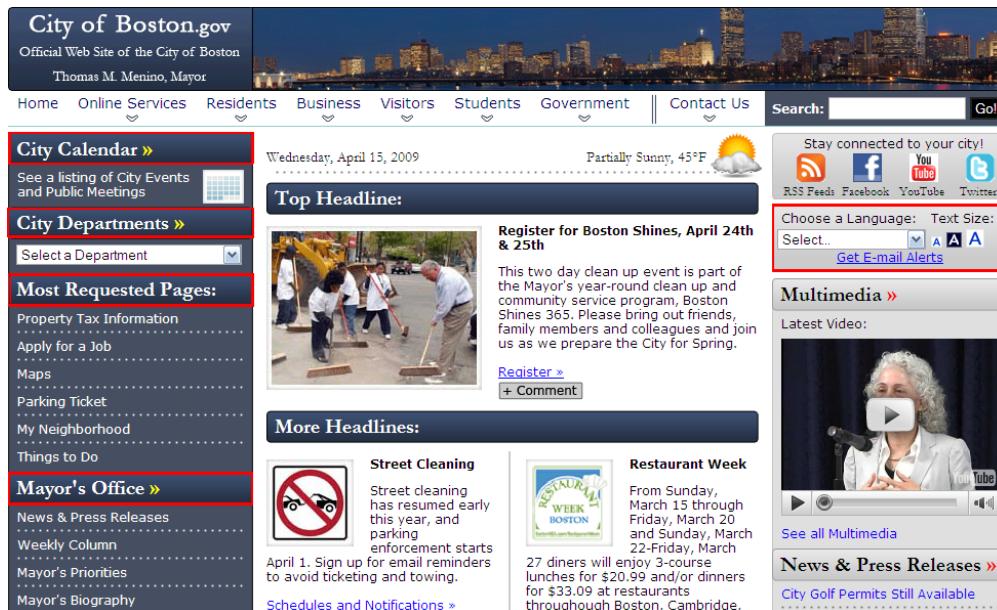


Figure 41: Increased size of headings and color contrast in template.

4.2: Template Evaluation

After creating the template, we evaluated it objectively. This was done to compare our template to the current website in order to deduce our successes and failures. We evaluated our template to determine its quality in terms of color scheme and accessibility.

4.2.1: Color Scheme

In order to evaluate the color scheme of the template, we used Truwex 2.0. The results of this evaluation tool are shown in Figure 42. Unlike in the current website, there were not any failed areas of color contrast in the template. We were not able to use AccessColor because it did not work with our code.



The screenshot shows the Truwex 2.0 interface. At the top, it reads "Truwex Online 2.0: Section 508 and WCAG Accessibility, Privacy, Quality Assurance Tool". Below this is a navigation bar with links: "Erigami Home", "Accessibility Check", "BITV Check", "Google Analytics Check", "Help", "Contacts", and "Test Results". The page URL is "http://users.wpi.edu/~mro/boston/index2.html". The main content area displays the City of Boston.gov website. On the left, there is a sidebar with "Accessibility issues" and "Accessibility warnings". The "Accessibility issues" section lists several WCAG violations with their counts and links to specific areas: "[WCAG 3.4 (2)] Fixed fonts are found 1 2 3 4 All", "[WCAG 3.5, 12.3 (2)] Hardly reachable text for voice reader is found 1 2 3 4 5 6 7 8 9 10 All", and "[WCAG 6.3 (1), 6.5 (2)] Script based link is found 1 2 3 All". The "Accessibility warnings" section lists: "[508 (B)] [WCAG 1.4 (1)] Multimedia presentation and its equivalent alternatives must be synchronized 1" and "[508 (D)] [WCAG 6.1 (1)] Documents must be organized so they are readable without requiring user agent support for style sheets 1". The main content area shows the City of Boston.gov homepage with a navigation menu, a "City Calendar" section, "City Departments" with a dropdown menu, "Most Requested Pages" (Property Tax Information, Apply for a Job, Maps, Parking Ticket, My Neighborhood, Things to Do), and "Mayor's Office". There is also an "Opinion Poll" section titled "Vote on the new site design!" with four radio button options: "A lot nicer!", "It's a good improvement.", "I am indifferent.", and "I don't really like it.", and "I hate it.". A "Submit Vote" button is present. Below the poll is a "More Headlines" section with "Street Cleaning" and "Restaurant Week". On the right side, there is a search bar, social media links (RSS, Facebook, YouTube, Twitter), a language and text size selector, and a "Multimedia" section with a "Latest Video" player showing a woman speaking.

Figure 42: Truwex 2.0: no failed areas of color contrast in template.

4.2.2: Layout

After developing our template, we performed the same metrics on it as we did on the current CityofBoston.gov (which can be seen in Appendix E-5). Our template produced results similar to that of the current site when considering total link count and repeated links with 176 links total and approximately 18% of them being repeated links (compared to 167 links with 16% repetition). However, we found that the use of drop

down menus and reducing the size of the top banner produced results that supported the changes that we made. On our template, out of the 176 links, 152, or 86%, of them can be seen in the first screen full, thus making them more accessible for all users.

4.2.3: Accessibility

We used EveryEye to see how a person at the age of 75 would see the template. These results are shown in Figure 43, which was greatly improved when compared to the EveryEye results of the template (Figure referencing previous section).

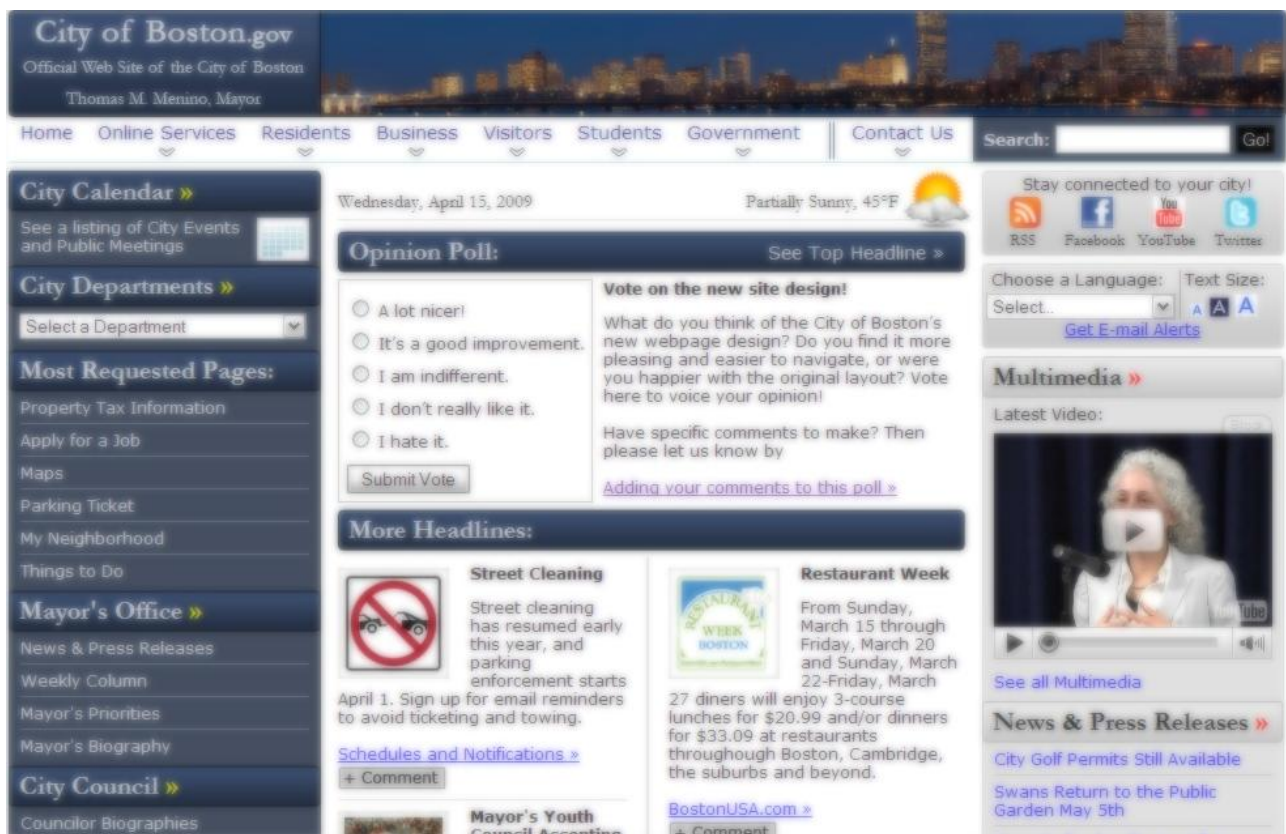


Figure 43: EveryEye view of template with vision at age 75.

We used Truwex 2.0 to evaluate the accessibility of the template. As shown in Figure 44, the bottom portion of the right column was an area that voice reader assistive tools can barely reach. This problem also exists in the current website, but the template is an improved version because there are no problems on the bottom left portion like there is on the current site.



Figure 44: Truex 2.0: areas of hardly reachable text for voice reader.

4.3: Web 2.0 Recommendations

Once the template was created, we discussed Web 2.0 recommendations for the Boston MIS department. We had to make recommendations because we did not possess the knowledge or time to implement such technologically advanced features. The Web 2.0 features which we felt could be beneficial for an e-government website like CityofBoston.gov were comment boxes, opinion polls, social networks, and various mashups.

4.3.1: Comment Boxes

Comment boxes give users the opportunity to express themselves on a website. A feature such as this would be perfect for an e-government website because it provides a “virtual voice” for the citizens. Additional justification for implementing comment boxes was provided by our survey results, which are displayed in Figure 45. Although the feedback was fairly widespread, we deduced that the 35% of respondents that felt that their likeliness of using comment boxes was “Maybe,” could be combined with the 30%

that felt “Likely” or “Highly Likely.” This 65% finding gave us enough reason to employ such a feature on the template.

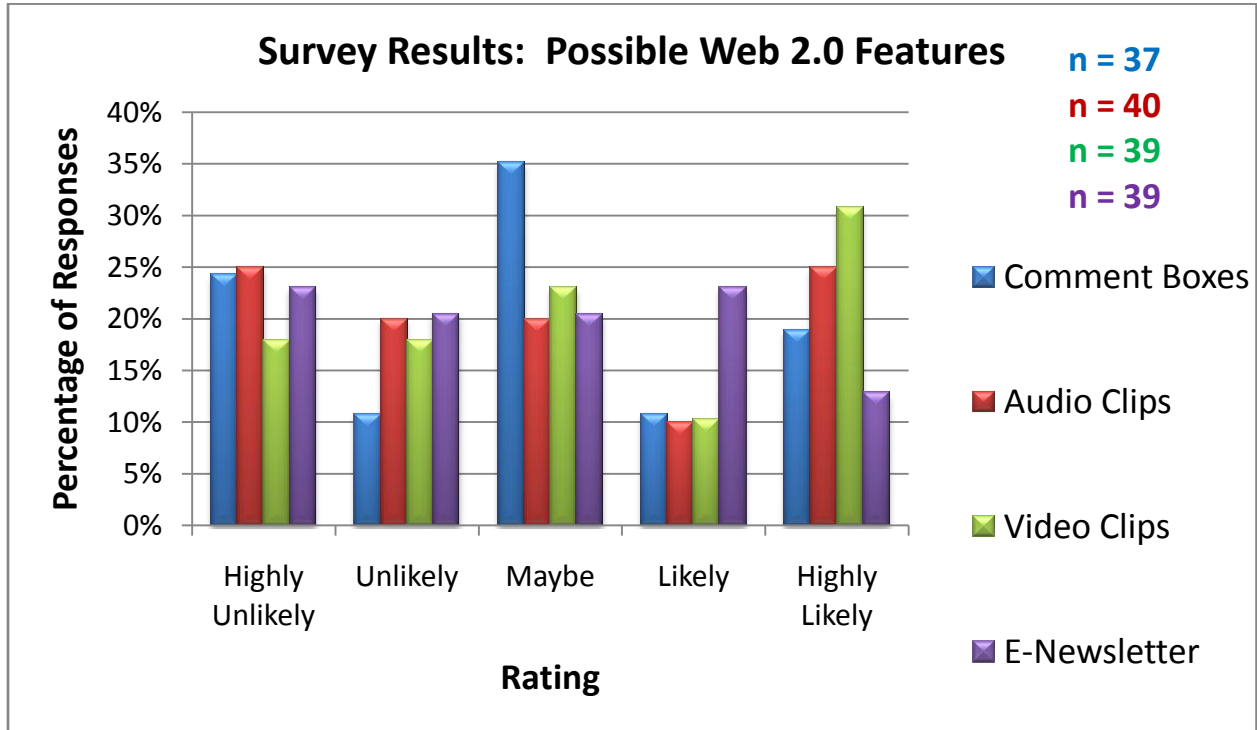


Figure 45: Survey results: possible Web 2.0 features to implement.

Unfortunately, we were not able to implement fully functioning comment boxes on our template, but we were able to create sample comment boxes, as seen in Figures 46 and 47.

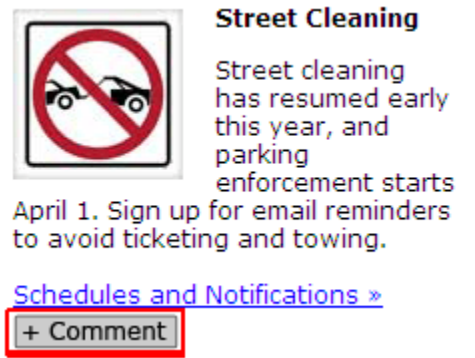


Figure 46: Link to comment box on template.

Comment/Discussion Area:

April 20th, 2009 -- 10:30AM
Jay B. said:

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.



April 20th, 2009 -- 11:22AM
Heather S. said:

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.



April 21st, 2009 -- 12:15PM
Mike O. said:

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.



April 22nd, 2009 -- 12:00PM
Cristian P. said:

Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua.



Figure 47: Sample comment boxes on template.

With this feature, users can enter their name, make a comment, and upload a picture, which are all optional. The one fallback of comment boxes on CityofBoston.gov is the fact that if somebody or something does not monitor the comments, chaos could erupt on the website. This could lead to inappropriate, malicious, or inaccurate comments and or pictures across the website. Basically, if too much freedom is given to users to comment on issues, the website could lose credibility and its professional appeal. But, such a problem can be solved by controlling or overseeing the comments being made.

4.3.2: Opinion Polls

Opinion polls are another means for users to potentially express their opinions on CityofBoston.gov. The implementation of such a feature can be justified by the survey results shown in Figure 48. Only 9% of the respondents gave negative feedback on such a feature, which gave us overwhelming reason to implement it on the template.

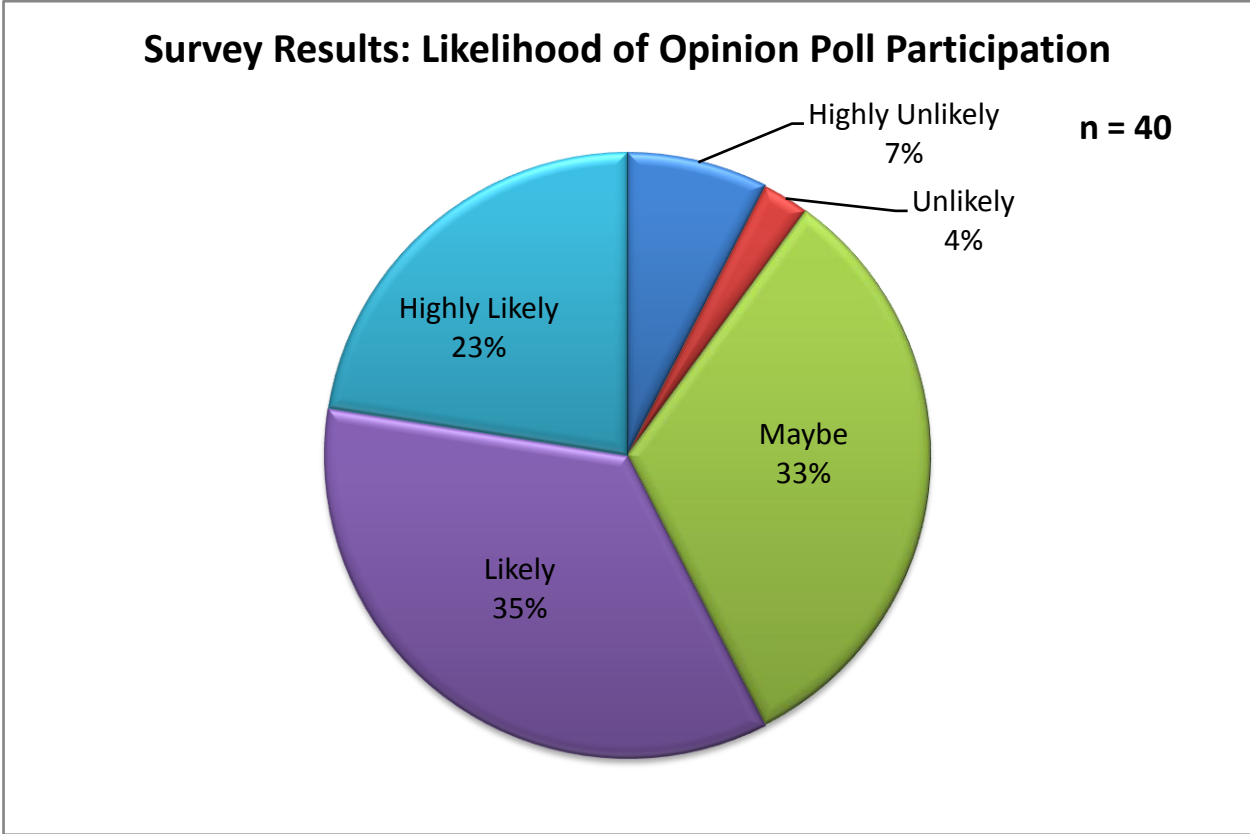


Figure 47: Survey results: likelihood of opinion poll participation.

The implementation of opinion polls on the template can be seen in Figures 49 and 50. Although we could not employ fully functioning opinion polls, we placed a sample in the template.

Opinion Poll:
[See Top Headline »](#)

- A lot nicer!
- It's a good improvement.
- I am indifferent.
- I don't really like it.
- I hate it.

Submit Vote

Vote on the new site design!

What do you think of the City of Boston's new webpage design? Do you find it more pleasing and easier to navigate, or were you happier with the original layout? Vote here to voice your opinion!

Have specific comments to make? Then please let us know by

[Adding your comments to this poll »](#)

Figure 49: Sample opinion poll question on template.



Figure 50: Sample opinion poll results on template.

A fallback of opinion polls is that the amount of times a user can participate in a poll must be restricted in order to generate accurate results. If a user can participate in a survey as many times as they want, the results will be skewed. In order to avoid this problem, one can simply limit the users to participate only once.

4.3.3: Social Networks

Social Networking sites such as Facebook and Twitter have been growing in popularity over recent years. These sites allow users to stay connected to other individuals, as well as keep updated on issues that they hold to be personally important (Barsky, 2006). With the importance of governmental issues to many people, or even the general appeal of some events organized by the city government, expansion of city information into these networks could prove beneficial. By providing important information through networks that many visitors are likely to already make use of, it creates new opportunity for civic engagement.

Once the city has established pages on these various social networks, links to them should be placed in an obvious manner on their official website. The reason for this is simple: without spreading the knowledge that these pages exist, they can't reach their maximum potential. So in our template, we have incorporated an area to include links to city social networking pages at the top of the right column (can be seen in Figures 33 and 37). These links would theoretically be present on every page of the website, so that no

matter where visitors enter the site they will see them. The links provided in our template are merely starting suggestions for some of the most prolific social networks; links to other social networks the city decides to expand into could easily also be placed here.

4.3.4: Mashups

As described briefly in section 2.3.5, a mashup is the creation of a new service through the combination of one or more information sources, in order to enhance the user's experience. Mashups can vary in complexity, from simple bits of information retrieved from other sources (current weather) to entire implementations of other subsystems (mapping technology). Some examples of mashups that we believe could add value to the content of CityofBoston.gov are simple weather reporting and embedded video/audio. Such mashups would add their value by adding to the richness of the media, thus improving user experience and engagement.

In our survey of users we asked about the likelihood of users making use of embedded audio and video, and the results of this question can be seen in Figure 45. Only 30% of individuals reported that they are unlikely to make use of such embedded media, leaving a majority who stated they either might or definitely would use such media.

The idea for embedded weather came from our highly-ranked reference point government websites, the Official websites of Denver and Sand Diego. Both of these websites incorporated weather reporting of some degree, as seen in Figures 51 and 52. We incorporated this feature above the main news story/opinion poll in our proposed template, as seen in Figure 53.



Figure 51: Weather mashup in Denver website.

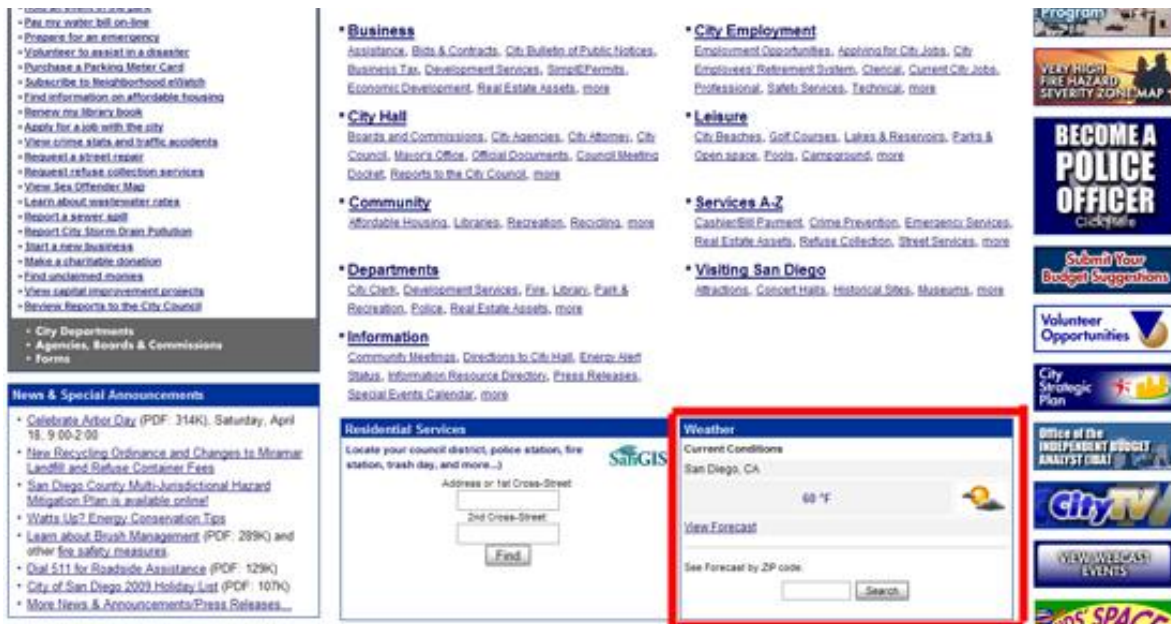


Figure 52: Weather mashup in San Diego website.

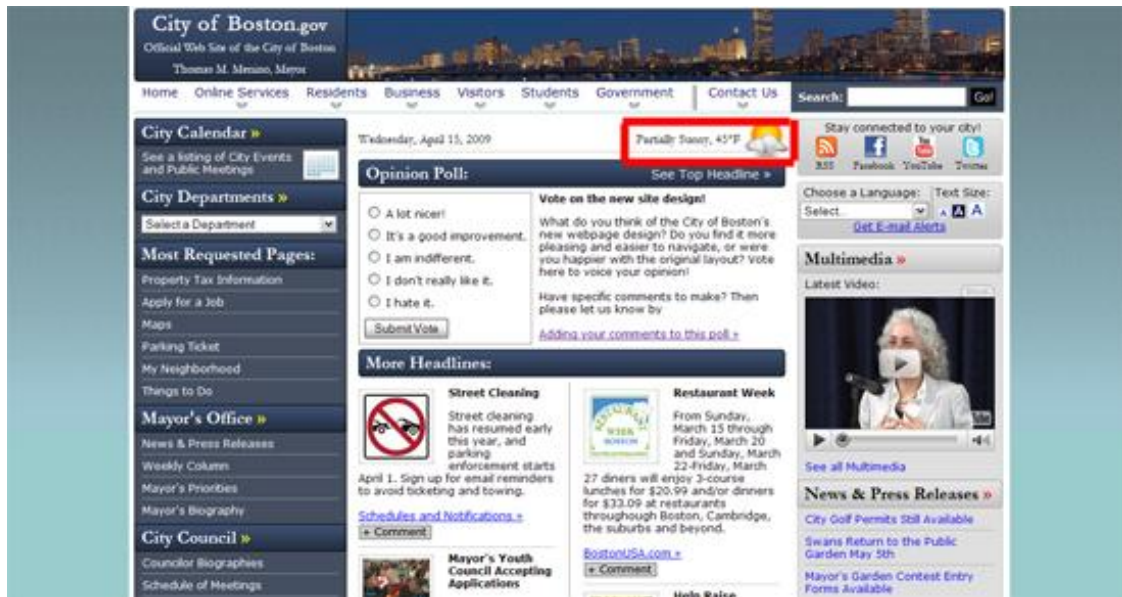


Figure 53: Weather mashup in our template.

4.3.4.1: Google Maps

One mashup that we were unable to ascertain the benefits of was one involving Google Maps. The incorporation of Google Maps into the website in order to interactively show the location of important events could improve user experience. Such locations that could be marked would be government buildings, locations of city calendar events, etc. Ascertaining if this would be a useful feature could be a point of future research to expand upon our work.

4.3.5: E-Newsletters

Another feature we asked users about on our survey was the idea of E-newsletters, which are basically digital versions of traditional newsletter which are E-mailed to subscribers on a regular basis. These are similar to RSS feeds, in that they keep users updated on important city issues, except they are sent out at a lower rate. However, while they are distributed on a less frequent basis, they typically would contain much more information at once. They could even incorporate rich media such as embedded video, which is not usually possible with RSS. When asked on our survey if users would make use of this feature, there was no clear majority. In fact, answers were pretty even across all five levels of response as seen in Figure 45, indicating that this feature has potential to

be useful but our results were not totally conclusive. We recommend this feature due to its potential usefulness to the public. However, a survey conducted for a longer period of time with more user participation could potentially get a more definitive result on the likely use levels of this aspect.

4.3.6: Homepage Customization

Although allowing users to log-in and customize their homepage can create a very user-oriented site, based on the results that we gathered from our survey, we would not recommend that this be implemented in CityofBoston.gov. As seen in Figure 54, over half of our survey respondents said that if they were able to log-in and create an account (allowing them to customize the homepage); they would either be “Highly Unlikely” or “Unlikely” to make use of this opportunity. One possible reason why we could have received these results is that about 60% of the people who took our survey said that they spend less than 10 minutes per week on cityofBoston.gov. With this small amount of time being spent on the site, it is likely that these people feel that creating a log-in account would not be of great use. Due to the lack of enthusiasm that we saw in our survey results, we would not recommend that homepage customization be implemented into CityofBoston.gov.

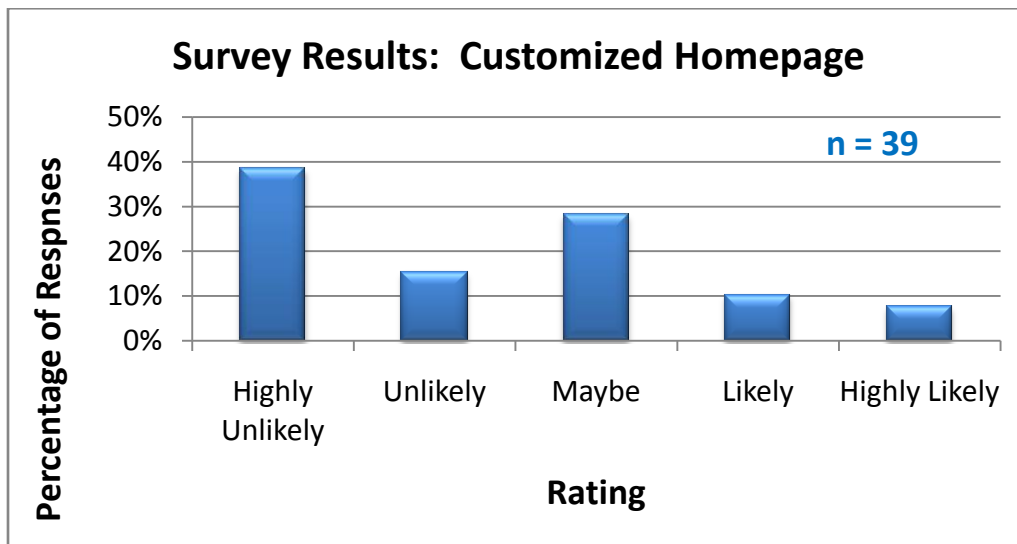


Figure 54: Survey results: customized homepage.

5.0 Conclusions and Recommendations

The primary objective of this project, Recommending Dynamic Web Design for the CityofBoston.gov, was to help Boston's MIS Department increase civic engagement on CityofBoston.gov via Web 2.0 and dynamic web design. The way we did this was to evaluate CityofBoston.gov subjectively and objectively. With the results gathered from the evaluation of the site, a template was created incorporating features we deemed helpful to reaching our goal.

A survey was posted on the City's website, its Facebook fan page, and its Youtube page, allowing us to gain user input on the website. The survey consisted of questions regarding the websites appearance as well as navigation. In addition to the survey, we researched other government websites that could serve as reference points; San Diego and Denver. Through the use of metrics and overall comparisons we were able to determine potential Web 2.0 features that could be included into Boston's website. Finally, online validation tools were used to verify if CityofBoston.gov was abiding by the W3C guidelines. This set of evaluations allowed us to assess the City's website through a user's perspective, compare it to other government websites, as well as making sure the website complies with W3C accessibility regulations.

We then created a functional template with the combination of our research and findings, incorporating the possible changes that we believe could be added to the City's website. The creation of this template was to visually incorporate Web 2.0 features not yet implemented on the current website, along with the addition of accessibility considerations. It was not made specifically as a direct replacement for CityOfBoston.gov, but instead as a visual representation of our findings and what could theoretically be done. We recommend a gradual addition of our possible improvements (as described in our findings section) along with polls to gauge feedback on each change. If the features are implemented in this manner, the users will have a voice in the new features being added and any unpopular changes can easily be modified or removed. This allows a more democratic feel to the alterations of the website, leaving users to measure the successes and failures of our recommendations.

The template that we created was then the focus of evaluations. Though the scope of our project only allowed us to evaluate the template objectively, it was a critical part of our project. The evaluations of the template allowed us to give Boston's MIS department a template with credible evaluations.

6.0 Future Recommendations

In the future there are several things that could be done in order to build off of the work that we completed for this project. By gaining more feedback from users and learning from the successes and failures of the template that we created, CityofBoston.gov could become a more dynamic site that encourages civic engagement.

To gain more feedback from users, another survey, with questions similar to the ones that we asked, could be conducted. However, we recommend that this survey be completed over a longer period of time as well as the promotion of its existence, thus allowing for more participation than we had in our survey. By obtaining more feedback, it would be possible to obtain a broader opinion of the user perspective of the current site. This would allow the MIS Department to make decisions about changes in the site that would reflect a larger portion of the population.

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Appendices

A-1: Introductory Email to Sponsor

Dear Mr. Jacob:

We are a group of third year undergraduates from Worcester Polytechnic Institute (WPI) interested in assisting your department in the development of a constituent-based view of the Boston.gov website. Our group consists of four members: Michael R. Oshetsky, Heather Standing, Cristian G. Pimentel, and Jay Bisa. The proposed goal is to foster more engagement among Boston residents and to incorporate Web2.0 features in the City's website. We envision beginning with an analysis of the current website and then transition into researching possible alterations that would bring your department closer to achieving this goal.

As college students, we utilize the internet on a daily basis for various purposes such as research, communication, and entertainment. With this much experience, we have gained an innate sense of which characteristics make a website either simple or difficult to use. Each individual in our group has a diverse educational and social background, which also offers us a unique outlook on this subject matter. We believe these experiences coupled with a grounding in the web development literature will provide you with meaningful recommendations for an improved website.

In order to begin the planning process, we would appreciate the opportunity to meet with you and gain your input, as well as your expectations. We are available on Tuesday, January 27, Thursday, January 29, or Tuesday, February 3 anytime after 4:30 pm. We realize that you likely have a busy schedule, so if these days are not convenient for you, we could conduct a phone meeting on any weekday after 3 pm.

For your convenience, you can communicate with the four of us via email, using our alias: boston-web@wpi.edu. We are looking forward to working with you on this project. Thank you for your time.

Best regards,

Jay Bisa

B-1: Survey for Subjective Evaluation

The data collected from this survey will be used to analyze the effectiveness and quality of the current CityofBoston.gov homepage.

1)
On average, how much time do you spend on CityofBoston.gov per week?

- Less than 10 minutes
- 10-60 minutes
- More than an hour

2)
Do you ever access CityofBoston.gov from a mobile phone?

- No
- Yes (please specify what type of mobile device below)

3)
How easy is it to find the following information on the homepage?

	Very difficult	Difficult	Not sure	Easy	Very Easy
City news	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Online services (i.e. paying parking tickets)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Property information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Contact information of city officials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Policies/Laws in Boston	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Job postings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Things to do in Boston	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4)
How would you rate the following aspects of the homepage content?

	Poor	Fair	Neutral	Good	Excellent
Organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Helpfulness of information (quality)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appeal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5)
How would you rate your typical experience while on CityofBoston.gov?

	Poor	Fair	Neutral	Good	Excellent
Ease of finding necessary information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Moving from one page to another	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interactive features (video, audio, polls, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accuracy of search engine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Usefulness of links	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Functionality of links	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Formatting of content (good use of titles, not too much/little text, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall color scheme and contrast	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Color of text	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size of text	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Font of text	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6)

Do you have any disabilities that would impact your interaction with a website? (Optional)

- No
- Yes (please explain if the website caters to your needs)

7)

If given the opportunity, would you:

	Highly Unlikely	Unlikely	Maybe	Likely	Highly Likely	Not Sure
Create a log-in account to customize homepage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Subscribe to content update alerts (RSS Feeds)	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Subscribe to an electronic newsletter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in citizen opinion polls	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Comment on posted articles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Watch video clips (city events, public speakers, etc.)	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Listen to audio clips (city events, public speakers, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8)

Which type of video/audio clips do you prefer?

- Short (0-5 minutes)
- Long (6+ minutes)

9)

Outside of CityofBoston.gov, do you use RSS feeds?

10)

Please list which language(s) is/are needed for multilingual options below.

11)

Have you ever used another government website? If so, how does CityofBoston.gov compare? (Optional)

12)

Specifically, how do you think the website could be improved? (Optional)

13)

Any additional comments or suggestions about the website in general? (Optional)

14)

Select all of the following that describe you: (Check all that apply)

- Student
- Employed
- Unemployed
- Retired
- Resident of Boston
- Visitor to Boston
- Business Owner
- Other, Please enter

15)

What is your birth year? (YYYY)

16)

Are you male or female?

- Male
- Female

C-1: Compiled Survey Responses

1. On average, how much time do you spend on CityofBoston.gov?

Time Spent Per Week	Percentage Responses
Less than 10 minutes	58%
10-60 minutes	38%
More than 60 minutes	5%

2. Do you ever access CityofBoston.gov from a mobile phone?

Mobile Phone	Percentage Responses
Yes	10%
No	90%

Phones used:
iphone
Blackberry
Tmobile MDA and Tmobile G1
Blackberry Storm

3. How easy is it to find the following information on the homepage?

	Very Difficult	Difficult	Not Sure	Easy	Very Easy
News	8%	26%	21%	28%	18%
Services	11%	25%	17%	33%	14%
Property	14%	28%	17%	28%	14%
Contact Info	8%	30%	22%	27%	14%
Laws	23%	36%	23%	10%	8%
Jobs	8%	19%	39%	22%	11%
Things to Do	11%	16%	34%	29%	11%

4. How would you rate the following aspects of the homepage content?

	Poor	Fair	Neutral	Good	Excellent
Organization	28%	35%	15%	10%	13%
Helpfulness	18%	34%	18%	18%	11%
Appeal	33%	28%	18%	10%	10%

5. How would you rate your typical experience on CityofBoston.gov?

	Poor	Fair	Neutral	Good	Excellent
Ease of Finding Info	35%	28%	10%	18%	10%
Moving Between Pages	21%	26%	16%	24%	13%
Interactive Features	28%	28%	23%	10%	13%
Accuracy of Search	18%	34%	21%	16%	11%
Link Usefulness	18%	33%	18%	20%	13%
Link Functionality	16%	32%	16%	26%	11%
Content Formatting	30%	28%	18%	13%	13%
Color Scheme	28%	10%	18%	31%	13%
Text Color	21%	11%	26%	26%	16%
Text Size	20%	10%	25%	30%	15%
Text Font	20%	10%	25%	30%	15%

6. Do you have any disabilities?

Disabilities	Percentage Responses
Yes	0%
No	100%

7. If given the opportunity, would you:

	Highly Unlikely	Unlikely	Maybe	Likely	Highly Likely
Create a Log-in	38%	15%	28%	10%	8%
Subscribe to Content Updates	30%	22%	16%	22%	11%
Subscribe to E-newsletters	23%	21%	21%	23%	13%
Participate in Online Polls	8%	3%	33%	35%	23%
Comment on News Stories	24%	11%	35%	11%	19%
Watch Video Clips	18%	18%	23%	10%	31%
Listen to Audio Clips	25%	20%	20%	10%	25%

8. Which type of video/audio clips do you prefer?

Clip Length	Percentage Responses
Short (0-5 min)	95%
Long (6+ min)	5%

9. Outside of CityofBoston.gov, do you use RSS feeds?

RSS Feeds	Percentage Responses
Yes	49%
No	51%

10. Please list which language(s) is/are needed for multilingual options below:

Responses:
Chinese
Spanish
English
Russian

11. Have you ever used another government website before? If so, how does CityofBoston.gov compare?

Responses:
Average
All government website are horrible
Yes. Better than most.
poor
Very well, superior to federal websites
Yes. Not as intuitive or well organized. Harder to navigate.
yes, various state and city sites, boston is slacking
I have found CityofBoston.gov to be nicer visually than cambridgema.gov
Whitehouse.gov--web site much better and other city web sites which are better
cob.gov is poor
Yes. It's very thorough and informative.
yes, better than Comm of Mass

12. Specifically, how do you think CityofBoston.gov could be improved?

Responses:
dump your lousy search engine ... allow drop-down limits (esp. date range)
better customer service
It should include the entire City of Boston
It seems a little busy as far as text goes on the main page
Submit complaints, questions to city hall, get tracking number and response
better navigation, better content, better search, less clutter
Complete redesign....more contemporary
Possibly add some drop down menus
depts don't respond to email contact
better page design, use of color and bold print
Make it more user friendly for the residents of the city
the web site for parking ticket/excise payment always fails
change the color scheme, make the first page less 'busy'; mapping on the assessing

13. Any additional comments or suggestions about the website in general?

Responses:
Mattapan is not included
It's difficult to find the information I'm looking for. There's not enough room
Contact info for neighborhood organizations, volunteer opportunities in neighbor
Sponsor a contest to redesign the site.
Love the pix. Very easy to read. Well organized. Not too busy.
depts should respond to emails
The side bars have so many links it's difficult to navigate and disorganized.
the web site for parking ticket/excise payment is weak/amateur
the department buttons are not intuitive
nothing easy except paying parking tickets
Bring back the ability to move from parcel to parcel on the maps page.
more ease of navigation
You can never find what you need on this website, and it discourages me

14. Select all of the following that describe you:

Option	Percentage Responses
Student	10%
Employed	80%
Unemployed	3%
Retired	3%
Resident of Boston	55%
Visitor to Boston	8%
Business Owner	3%
Other	8%

Other:
Activist
Resident of Cambridge
Research

15. What is your birth year?

Age Range:	22 to 65 years
Average Age:	40.78 years
Number Answered:	36

16. Are you male or female?

Gender	Percentage Responses
Male	48%
Female	53%

C-2: Individual Survey Responses

Note: 0 represents an unanswered question

Age	Gender	Occupation	Time Spent	Mobile Phone	Finding news	Finding services	Finding Property	Finding Contact	
31	M	E/Res	10-60	Y	3	2	3	1	
58	M	E/Res	< 10	N	3	3	4	0	
42	M	Research	10-60	N	5	5	5	2	
27	F	E	10-60	N	2	2	2	3	
50	M	E	< 10	N	5	0	5	5	
54	F	E	< 10	N	3	3	2	4	
22	F	S	< 10	N	3	4	2	3	
26	M	E	< 10	N	4	4	1	4	
53	F	S/E/Res	10-60	N	1	1	1	2	
42	F	E	10-60	N	4	3	3	4	
32	M	Res	< 10	N	2	2	2	1	
22	F	S/Vis	< 10	N	2	4	4	3	
36	F	E	< 10	N	4	4	4	3	
38	F	E	10-60	N	3	4	2	4	
0	M	E	10-60	N	1	1	1	1	
0	F	Res	10-60	N	2	2	2	2	
43	M	E/Res	< 10	N	2	2	2	2	
29	F	E/Res	10-60	Y	2	2	0	4	
54	M	E/Res	10-60	N	2	2	4	4	
56	M	E/Vis/BO	10-60	N	2	2	2	2	
60	F	E/Res	< 10	N	5	3	4	2	
47	F	S/E/Vis	< 10	N	5	5	5	5	
48	F	E	< 10	N	4	0	0	0	
53	M	E/Res	< 10	N	2	3	4	2	
0	M	E	10-60	N	3	1	3	3	
42	M	E/Res	60+	Y	0	4	4	4	
45	M	E/Res	< 10	N	3	0	2	2	
27	F	E/Res	< 10	N	4	5	3	5	
54	M	E/Res	10-60	N	4	0	5	0	
28	F	E/ResCam	< 10	N	4	4	3	4	
35	M	E/Res	< 10	N	4	2	4	4	
23	F	E/Res	10-60	N	5	4	0	2	
34	F	E/Res	< 10	N	2	4	2	3	
42	F	E/Res	60+	N	5	5	5	5	
37	M	U	< 10	N	5	4	4	5	
0	F	Res/Activist	10-60	N	3	4	1	2	
51	M	E/Res	< 10	N	4	3	0	3	
34	F	E/Res	< 10	N	4	5	3	3	
65	F	Ret	< 10	N	4	4	4	4	
28	M	E/Res	< 10	Y	1	1	1	2	
					# Answered	39	36	36	37
					Average	3.23	3.14	3	3.08
					Correlation	0.0921	-0.1523	0.3419	0.0278

Individual Responses Continued:

Age	Finding Contact	Finding Laws	Finding Jobs	Finding things to do	Organization	Helpfulness	Appeal
31	1	2	3	3	3	3	3
58	0	2	3	3	2	2	2
42	2	2	3	5	4	4	4
27	3	3	2	2	2	4	2
50	5	5	5	5	5	5	5
54	4	3	3	3	2	2	2
22	3	3	3	4	3	3	3
26	4	1	4	1	2	2	2
53	2	1	2	1	1	1	1
42	4	4	2	4	2	2	2
32	1	1	1	1	1	1	1
22	3	2	4	2	2	3	2
36	3	3	1	3	2	3	3
38	4	3	3	4	4	4	4
0	1	1	0	0	1	1	1
0	2	2	2	2	1	1	1
43	2	2	2	2	2	2	1
29	4	2	2	4	2	2	1
54	4	2	3	2	1	1	1
56	2	2	2	2	1	2	1
60	2	2	3	3	3	4	4
47	5	5	5	5	5	5	5
48	0	0	0	0	4	0	0
53	2	1	0	4	2	2	1
0	3	3	3	3	1	1	1
42	4	1	4	4	1	1	1
45	2	1	3	3	1	3	1
27	5	3	5	5	5	5	5
54	0	2	0	3	4	0	2
28	4	3	4	4	2	4	3
35	4	2	4	4	2	2	2
23	2	2	4	3	1	2	2
34	3	1	3	3	2	2	2
42	5	5	3	3	5	5	5
37	5	4	3	4	5	4	4
0	2	2	4	4	2	2	3
51	3	3	3	3	3	3	3
34	3	4	5	3	3	3	2
65	4	4	4	4	3	4	3
28	2	1	1	1	1	2	1
# Answered	37	39	36	38	40	38	39
Average	3.08	2.44	3.08	3.13	2.45	2.68	2.36
Correlation	0.0278	0.0260	-0.0100	0.0835	0.0829	-0.0267	0.0016

Individual Responses Continued:

Age	Finding Info	Moving	Interactive	Search Engine	Links Usefulness	Link Function
31	1	4	3	3	3	3
58	2	4	2	1	2	2
42	1	4	4	2	2	2
27	2	4	2	3	3	3
50	5	5	5	5	5	5
54	1	2	3	2	3	4
22	2	3	3	2	2	2
26	2	4	3	2	2	4
53	1	2	2	2	2	2
42	2	3	3	4	4	4
32	1	1	1	1	1	1
22	2	3	1	4	3	2
36	3	3	2	3	3	3
38	4	4	4	4	4	4
0	1	1	1	1	1	1
0	1	1	1	1	1	1
43	2	2	1	2	2	2
29	3	4	2	2	2	2
54	1	2	3	1	1	1
56	1	1	1	2	1	2
60	4	4	3	3	4	4
47	5	5	5	5	5	5
48	4	0	4	0	5	0
53	3	2	2	2	2	3
0	1	1	1	0	1	1
42	1	2	2	2	2	4
45	1	1	1	4	2	2
27	4	5	5	3	4	4
54	2	0	2	4	4	4
28	4	3	3	3	4	3
35	3	2	1	1	2	2
23	2	2	1	3	3	3
34	1	2	2	2	2	2
42	5	5	5	5	5	5
37	5	5	5	5	5	5
0	2	1	3	2	3	0
51	2	2	2	2	2	2
34	4	3	2	3	4	4
65	4	4	4	4	4	4
28	1	1	1	1	1	1
# Answered	40	38	40	38	40	38
Average	2.4	2.82	2.53	2.66	2.78	2.84
Correlation	0.0597	-0.0432	0.1607	0.0462	0.0847	0.1521

Individual Responses Continued:

Age	Formatting	Color Scheme	Text Color	Text Size	Text Font	Disabilities	Clip Length	RSS feeds
31	3	3	3	3	3	N	short	Y
58	2	1	1	1	1	N	short	N
42	4	4	4	4	4	N	short	Y
27	3	4	4	4	4	N	short	N
50	5	5	5	5	5	N	short	Y
54	3	4	4	4	4	N	short	N
22	2	4	4	4	4	N	short	N
26	1	2	2	1	2	N	short	N
53	2	4	4	4	4	N	short	N
42	2	3	3	3	3	N	short	Y
32	1	1	1	1	1	N	short	Y
22	2	4	3	2	2	N	short	N
36	3	4	4	4	4	N	short	N
38	4	4	4	4	4	N	short	N
0	1	1	1	1	1	N	short	
0	1	1	1	1	3	N	short	N
43	1	1	2	2	1	N	short	Y
29	4	4	4	4	4	N	short	Y
54	1	1	1	1	1	N		Y
56	1	1	1	1	1	N	short	Y
60	4	4	4	4	4	N	short	N
47	5	5	5	5	5	N	short	Y
48	4	0	5	5	5	N	short	N
53	2	1	1	3	3	N	short	Y
0	1	3	3	3	3	N	short	N
42	1	1	3	3	3	N	short	Y
45	3	1	2	3	1	N	short	Y
27	5	5	5	5	5	N	short	N
54	3	4	0	4	4	N	long	N
28	2	4	4	4	4	N	short	N
35	2	2	3	3	3	N	short	Y
23	1	3	3	3	3	N	short	Y
34	2	3	3	3	3	N	short	Y
42	5	5	5	5	5	N	long	N
37	5	5	5	5	5	N	short	Y
0	1	3	3	3	3	N	short	N
51	2	2	2	2	2	N	short	N
34	2	2	0	2	2	N	short	Y
65	3	3	3	4	4	N	short	N
28	1	1	1	1	1	N	short	Y

# Answered	40	39	38	40	40
Average	2.5	2.90	3.05	3.1	3.1
Correlation	0.1273	-0.1618	-0.1467	0.0460	0.0006

Individual Responses Continued:

Age	Log-in	Content Update	E-newsletter	Polls	Comment	Watch Clips	Listen Clips
31	1	1	1	4	5	1	1
58	1	1	1	4	4	1	1
42	4	5	5	3	1	2	1
27	3	2	4	5	3	5	4
50	3	0	4	5	5	5	4
54	1	1	2	3	4	5	5
22	2	2	2	3	3	3	3
26	1	1	1	3	1	5	5
53	2	1	5	5	5	2	2
42	3	4	4	4	3	5	5
32	1	1	1	1	1	1	1
22	3	3	2	5	3	5	3
36	1	1	1	3	1	2	2
38	2	2	2	3	3	3	2
0	1	3	1	3	1	2	2
0	1	1	3	3	3	2	1
43	3	3	3	4	3	3	3
29	1	4	4	4	1	5	5
54	5	4	4	5	4	1	1
56	3	4	3	4	3	5	5
60	1	2	2	4	2	2	1
47	1	5	3	1	3	5	5
48	2	3	3	4	0	3	3
53	3	4	3	5	5	4	3
0	1	1	1	1	1	1	1
42	4	4	2	5	5	1	1
45	5	5	5	5	5	5	5
27	4	2	5	3	2	3	3
54	2	2	3	4	2	3	2
28	1	3	2	4	1	1	1
35	1	1	1	3	1	3	3
23	3	4	4	3	4	4	4
34	2	2	4	2	2	2	2
42	0	4	4	4	0	4	4
37	5	5	5	5	5	5	5
0	1	1	1	4	3	3	2
51	3	0	3	3	3	0	3
34	4	2	2	3	3	3	2
65	3	3	4	4	0	4	5
28	3	0	0	4	3	5	5
# Answered	39	37	39	40	37	39	40
Average	2.33	2.62	2.82	3.63	2.89	3.18	2.90
Correlation	0.0549	0.1142	0.1451	0.2198	0.3403	-0.0830	-0.0382

D-1: Reference Points

Screenshot of San Diego:

The screenshot shows the San Diego City website with the following elements:

- Header:** "sandiego.gov", "Contact the City", "SD", "America's Finest City", "THE CITY OF SAN DIEGO".
- Navigation:** Business, City Hall, Community, Departments, Information, Leisure, Services A-Z, Visiting.
- Investor Information:** "The only investor information on this Web site that is intended for the investor community is located on the Investor Information Web page. More..."
- Emergency Notifications:** "Self Register here to receive Emergency Notifications to your cell phone, VoIP phone, and email address. Note: Land lines are automatically registered for this service."
- City Government Links:** Information Resource Directory, "I want to..." menu with links like "Pay my parking citation online", "View Current City Real Estate Listings", etc.
- LEVEL 1 Water Emergency:** "click for more information".
- Latest News:** "Mayor Presents FY 2010 Proposed Budget", "The Water Crisis, Conservation, and You".
- Weekly Web Feature:** "Lifeguard Services: Prepare for fun at San Diego's beaches and bays with important water safety information".
- Business:** Assistance, Bids & Contracts, City Bulletin of Public Notices, Business Tax, Development Services, etc.
- City Hall:** Boards and Commissions, City Agencies, City Attorney, City Council, Mayor's Office, etc.
- Community:** Affordable Housing, Libraries, Recreation, Recycling, more.
- Departments:** City Clerk, Development Services, Fire, Library, Park & Recreation, Police, Real Estate Assets, more.
- Information:** Community Meetings, Directions to City Hall, Energy Alert Status, Information Resource.
- City Employment:** Employment Opportunities, Applying for City Jobs, City Employees' Retirement System, etc.
- Leisure:** City Beaches, Golf Courses, Lakes & Reservoirs, Parks & Open space, Pools, Campground, more.
- Services A-Z:** Cashier/Bill Payment, Crime Prevention, Emergency Services, Real Estate Assets, Refuse Collection, Street Services, more.
- Visiting San Diego:** Attractions, Concert Halls, Historical Sites, Museums, more.
- Right Side:** Mayor Jerry Sanders photo, "Home Page", "Contact My City", "Sign Up for E-U", "Elected Officials", "Fire Pit Program", "VERY HIGH FIRE HAZARD SEVERITY ZON", "BECOM POLI OFFIC", "Volunteer Opportunities".

Screenshot of Denver:

The screenshot shows the Denver City website with the following elements:

- Header:** "DENVER THE MILE HIGH CITY", "SEARCH", "Residents", "Visitors", "Business", "Elected Officials".
- Navigation:** "Go Directly to a City Agency" dropdown.
- FIND SERVICES:** Animals and Pets, Attractions and Events, Building and Construction, Business Services, City Planning, Courts and Legal, Elections, Emergency Information, Environment, Government and Legislation, Health and Social Services, Housing and Property Assistance, Jobs, Licenses and Permits, Neighborhood Information, Parks and Recreation, Police, Fire and Safety, Records and Documents, Schools and Youth Programs, Transportation and Streets, Trash and Recycling.
- Citywide Street Sweeping:** "Show Your Pride - Move your Ride. It's street sweeping season! Help keep Denver's streets clean. Check [how it works](#) here."
- Top Headlines:** "Denver Update: Weekly News Summary" (April 24 - 30, 2009), "Flu Information" (H1N1 Influenza), "News Archives" (12345), "Current Headlines".
- More News:** "Denver Update: Weekly News Summary", "Two New Appointees Join Administration", "2008 Democratic National Convention Impact Report", "Denver 2008 Census: Aim at Complete Count".
- Quick Links:** For Visitors, For Residents, For Businesses.
- Denver 8 TV:** "VIDEOS...and more.", "DENVER 8 YOUR CITY. YOUR SOURCE.", "Live, or Archived TV programs, meetings, schedules, info."
- Events Calendar:** "Visit Denver's premier cultural events calendar for the best activity that Denver has to offer.", "Denver 8 6 5 Denver's Year-Round Family Guide", "VIDEO CELEBRATE! SPENDING IDEAS".

E-1: San Diego Links

Note: Red represents “NO”, Green represents “YES”

Link	First Screenfull?	In Dropdown?	Unique?
http://www.sandiego.gov/directories/contact.shtml	Green	Red	Green
http://www.sandiego.gov/sdgateway/index.shtml	Green	Red	Green
http://www.sandiego.gov/directories/business.shtml	Green	Red	Green
http://www.sandiego.gov/directories/government.shtml	Green	Red	Green
http://www.sandiego.gov/directories/community.shtml	Green	Red	Green
http://www.sandiego.gov/directories/departments.shtml	Green	Red	Green
http://www.sandiego.gov/directories/information.shtml	Green	Red	Green
http://www.sandiego.gov/directories/leisure.shtml	Green	Red	Green
http://www.sandiego.gov/directories/services.shtml	Green	Red	Green
http://www.sandiego.gov/directories/visiting.shtml	Green	Red	Green
http://www.sandiego.gov/investorinformation/	Green	Red	Green
http://www.sandiego.gov/directories/disclaimer.shtml#investor	Green	Red	Green
http://www.sandiego.gov/ohs/emergencynotification/index.shtml	Green	Red	Green
http://www.sandiego.gov/citizensassistance/resource.shtml	Green	Red	Green
https://step1.caledoncard.com/tickets/sandiego.html	Green	Red	Green
http://www.sandiego.gov/real-estate-assets/index.shtml	Green	Red	Green
http://google.sannet.gov/search?partialfields=&proxyreload=1&num	Green	Red	Green
http://www.sandiego.gov/iba/index.shtml	Green	Red	Green
http://apps.sandiego.gov/secalweb/doAction.do?action=week	Red	Red	Green
http://www.sandiego.gov/park-and-recreation/general-info/permits.shtml	Red	Red	Green
https://secure3.i-doxs.net/cityofsandiego/	Red	Red	Green
http://www.sandiego.gov/ohs/index.shtml	Red	Red	Green
http://www.sandiego.gov/fireandems/cert/index.shtml	Red	Red	Green
http://www.sandiego.gov/parking/enforcement/cards.shtml	Red	Red	Green
http://apps.sandiego.gov/ewatch/index.jsp	Red	Red	Green
http://www.sandiego.gov/housing/index.shtml	Red	Red	Green
http://www.sandiego.gov/public-library/services/holds.shtml	Red	Red	Green
https://apps.sandiego.gov/pjaol/currjob/open.jsp	Red	Red	Green
http://www.sandiego.gov/police/stats/index.shtml#monthly	Red	Red	Green
http://apps.sandiego.gov/streetdiv/	Red	Red	Green
http://apps.sandiego.gov/econtainer/	Red	Red	Green
http://www.sandiego.gov/police/newsflash/sexoffender.shtml	Red	Red	Green
http://www.sandiego.gov/mwwd/sewerspill/index.shtml	Red	Red	Green
http://www.sandiego.gov/stormwater/servicerequest/	Red	Red	Green
http://www.sandiego.gov/economic-development/business-assistance/small-business/	Red	Red	Green
http://www.sandiego.gov/philanthropycenter/	Red	Red	Green
http://www.sandiego.gov/comptroller/index.shtml	Red	Red	Green
http://citymaps.sandiego.gov/imf/sites/ciptpub/CIPGISIntro.jsp	Red	Red	Green

http://google.sannet.gov/search?partialfields=&sort=date			
http://www.sandiego.gov/directories/departments.shtml			
http://www.sandiego.gov/directories/government.shtml			
http://www.sandiego.gov/directories/forms.shtml			
http://www.sandiego.gov/press/pdf/090625election.pdf			
http://www.sandiego.gov/environmental-services/index.shtml			
http://www.sandiego.gov/ohs/index.shtml			
http://www.sandiego.gov/environmental-services/energy/conservation/wattsup.shtml			
http://www.sandiego.gov/fireandems/pdf/brushpdf.pdf			
http://www.sandiego.gov/fireandems/inspections/brush.shtml			
http://www.sandiego.gov/press/pdf/dra070329.pdf			
http://www.sandiego.gov/press/holidaylist.pdf			
http://www.sandiego.gov/directories/news.shtml			
http://www.sandiego.gov/awards/index.shtml			
http://www.sandiego.gov/water/conservation/drought/index.shtml			
http://www.sandiego.gov/fm/proposed/			
http://www.sandiego.gov/fm/proposed/pdf/fy10briefings.pdf			
http://www.sandiego.gov/water/conservation/drought/index.shtml			
http://www.sandiego.gov/water/conservation/faq/			
http://www.sandiego.gov/water/recreation/			
http://www.sandiego.gov/webfeature/			
http://www.sandiego.gov/directories/business.shtml			
http://www.sandiego.gov/economic-development/business-assistance/index.shtml			
http://www.sandiego.gov/bids-contracts/			
http://www.sandiego.gov/city-clerk/officialdocs/notices/index.shtml			
http://www.sandiego.gov/treasurer/index.shtml#btax			
http://www.sandiego.gov/development-services/			
http://www.sandiego.gov/development-services/industry/simplepermits.shtml			
http://www.sandiego.gov/economic-development/			
http://www.sandiego.gov/real-estate-assets/			
http://www.sandiego.gov/directories/business.shtml			
http://www.sandiego.gov/directories/government.shtml			
http://www.sandiego.gov/city-clerk/boards-commissions/			
http://www.sandiego.gov/directories/government.shtml			
http://www.sandiego.gov/cityattorney/			
http://www.sandiego.gov/citycouncil/			
http://www.sandiego.gov/mayor/			
http://www.sandiego.gov/city-clerk/officialdocs/index.shtml			
http://google.sannet.gov/search?partialfields=&proxyreload=1&num			
http://google.sannet.gov/search?partialfields=&sort=date			
http://www.sandiego.gov/directories/government.shtml			
http://www.sandiego.gov/directories/community.shtml			
http://www.sandiego.gov/housing/index.shtml			

http://www.sandiego.gov/public-library/			
http://www.sandiego.gov/park-and-recreation/			
http://www.sandiego.gov/environmental-services/recycling/			
http://www.sandiego.gov/directories/community.shtml			
http://www.sandiego.gov/directories/departments.shtml			
http://www.sandiego.gov/city-clerk/			
http://www.sandiego.gov/development-services/			
http://www.sandiego.gov/fireandems/			
http://www.sandiego.gov/public-library/			
http://www.sandiego.gov/park-and-recreation/			
http://www.sandiego.gov/police/			
http://www.sandiego.gov/real-estate-assets/			
http://www.sandiego.gov/directories/departments.shtml			
http://www.sandiego.gov/directories/information.shtml			
http://www.sandiego.gov/communitymeetings/cal.shtml			
http://www.sandiego.gov/directories/servmap1.shtml			
http://www.sandiego.gov/environmental-services/energy/index.shtml			
http://www.sandiego.gov/citizensassistance/resource.shtml			
http://www.sandiego.gov/directories/news.shtml			
http://apps.sandiego.gov/secalweb/doAction.do?action=calendar			
http://www.sandiego.gov/directories/information.shtml			
http://www.sandiego.gov/directories/jobopp.shtml			
http://www.sandiego.gov/empopp/			
http://www.sandiego.gov/empopp/apptest/index.shtml			
https://www.sdcers.org/Pages/default.aspx			
https://apps.sandiego.gov/pjaol/currjob/control?view=OpenJobListing&job_category_cd=Clerical			
https://apps.sandiego.gov/pjaol/currjob/index.jsp			
https://apps.sandiego.gov/pjaol/currjob/control?view=OpenJobListing&job_category_cd=Admin			
https://apps.sandiego.gov/pjaol/currjob/control?view=OpenJobListing&job_category_cd=Safety+Srv			
https://apps.sandiego.gov/pjaol/currjob/control?view=OpenJobListing&job_category_cd=Technical			
http://www.sandiego.gov/directories/jobopp.shtml			
http://www.sandiego.gov/directories/leisure.shtml			
http://www.sandiego.gov/lifeguards/beaches/			
http://www.sandiego.gov/park-and-recreation/golf/index.shtml			
http://www.sandiego.gov/water/recreation/index.shtml			
http://www.sandiego.gov/park-and-recreation/parks/index.shtml			
http://www.mtrp.org/campground/			
http://www.sandiego.gov/directories/leisure.shtml			
http://www.sandiego.gov/directories/services.shtml			
http://www.sandiego.gov/treasurer/			
http://www.sandiego.gov/police/prevention/			
http://www.sandiego.gov/fireandems/911/			
http://www.sandiego.gov/real-estate-assets/index.shtml			

http://www.sandiego.gov/environmental-services/collection/index.shtml			
http://apps.sandiego.gov/streetdiv/			
http://www.sandiego.gov/directories/services.shtml			
http://www.sandiego.gov/directories/visiting.shtml			
http://www.sandiego.gov/directories/visiting.shtml#animal			
http://www.sandiego.gov/directories/visiting.shtml#concert			
http://www.sandiego.gov/directories/visiting.shtml#historical			
http://www.sandiego.gov/directories/visiting.shtml#museums			
http://www.sandiego.gov/directories/visiting.shtml			
http://apps.sandiego.gov/weather/			
http://www.sandiego.gov/mayor/			
http://www.sandiego.gov/mayor/			
http://www.sandiego.gov/mayor/contact/			
http://www.sandiego.gov/mayor/			
http://www.sandiego.gov/mayor/			
http://www.sandiego.gov/citycouncil/			
http://www.sandiego.gov/cityattorney/			
http://www.sandiego.gov/orgchart/orgchart.shtml			
http://www.co.san-diego.ca.us/			
http://www.ca.gov/			
http://www.usa.gov/			
http://www.sandiego.gov/philanthropycenter/opportunities/firepit.shtml			
http://www.sandiego.gov/fireandems/forms/severity.shtml			
http://www.sandiego.gov/police/recruiting/			
http://www.sandiego.gov/volunteer-program/index.shtml			
http://www.sandiego.gov/strategicplan/index.shtml			
http://www.sandiego.gov/iba/index.shtml			
http://www.sandiego.gov/citytv/index.shtml			
http://granicus.sandiego.gov/ViewPublisher.php?view_id=31			
http://www.sandiego.gov/kidsspace/index.shtml			
http://www.sandiego.gov/directories/map.shtml			
http://www.sandiego.gov/awards/index.shtml			
http://www.sandiego.gov/directories/privacy.shtml			
http://www.sandiego.gov/directories/disclaimer.shtml			
http://www.sandiego.gov/directories/business.shtml			
http://www.sandiego.gov/directories/government.shtml			
http://www.sandiego.gov/directories/community.shtml			
http://www.sandiego.gov/directories/departments.shtml			
http://www.sandiego.gov/directories/information.shtml			
http://www.sandiego.gov/directories/leisure.shtml			
http://www.sandiego.gov/directories/services.shtml			
http://www.sandiego.gov/directories/visiting.shtml			
http://www.sandiego.gov/directories/search.shtml			

http://www.sandiego.gov/directories/map.shtml			
http://www.sandiego.gov/awards/			
http://www.sandiego.gov/directories/contact.shtml			
http://www.sandiego.gov/directories/privacy.shtml			
http://www.sandiego.gov/directories/disclaimer.shtml			
172 total	37 in first view	0 in dropdown	60 repeated

E-2: Denver Links

Link	In Dropdown?	Unique?	First Screenfull?
http://denvergov.org/			
http://denvergov.org/DenverGovHome/Residents/tabid/37892/Default.aspx?skintab=Residents			
http://denvergov.org/DenverGovHome/Visitors/tabid/37893/Default.aspx?skintab=Visitors			
http://denvergov.org/DenverGovHome/Business/tabid/37894/Default.aspx?skintab=Business			
http://denvergov.org/ElectedOfficials/tabid/37896/Default.aspx?skintab=Elected%20Officials			
http://denvergov.org/tabid/426737/Default.aspx			
https://denver.311colorado.com/psp/311PROD/CUSTOMER/CUST/h/?tab=PAPP_GUEST			
http://denvergov.org/Default.aspx?alias=denvergov.org/assessor			
http://denvergov.org/Default.aspx?alias=denvergov.org/auditor			
http://denvergov.org/Default.aspx?alias=denvergov.org/boa			
http://denvergov.org/Default.aspx?alias=denvergov.org/board_of_ethics			
http://www.denvergov.org/Home/tabid/432002/Default.aspx			
http://denvergov.org/Default.aspx?alias=denvergov.org/cob			
http://denvergov.org/Default.aspx?alias=denvergov.org/city_attorney			
http://denvergov.org/Default.aspx?alias=denvergov.org/citycouncil			
http://denvergov.org/Default.aspx?alias=denvergov.org/civilservice			
http://denvergov.org/Default.aspx?alias=denvergov.org/clerk_and_recorder			
http://denvergov.org/Default.aspx?alias=denvergov.org/communitycorrections			
http://denvergov.org/Default.aspx?alias=denvergov.org/planning			
http://denvergov.org/Default.aspx?alias=denvergov.org/controller			
http://denvergov.org/Default.aspx?alias=denvergov.org/countycourt			
http://denvergov.org/Default.aspx?alias=denvergov.org/decc			
http://denvergov.org/Default.aspx?alias=denvergov.org/denver8tv			
http://denvergov.org/Default.aspx?alias=denvergov.org/art_museum			
http://denvergov.org/Default.aspx?alias=denvergov.org/denverda			
http://denvergov.org/Default.aspx?alias=denvergov.org/dia			
http://denvergov.org/Default.aspx?alias=denvergov.org/artculturefilm			
http://denvergov.org/Default.aspx?alias=denvergov.org/library			
http://denvergov.org/Default.aspx?alias=denvergov.org/dura			
http://denvergov.org/Default.aspx?alias=denvergov.org/denver_water			
http://denvergov.org/Default.aspx?alias=denvergov.org/derp			
http://www.milehigh.com/			
http://denvergov.org/Default.aspx?alias=denvergov.org/education			
http://www.denvergov.org/Default.aspx?alias=www.denvergov.org/elections			
http://www.denvergov.org/Default.aspx?alias=www.denvergov.org/emergencyinformationcenter			
http://denvergov.org/Default.aspx?alias=denvergov.org/employeeassistance			
http://denvergov.org/Default.aspx?alias=denvergov.org/deh			
http://denvergov.org/Default.aspx?alias=denvergov.org/excise_and_licenses			
http://denvergov.org/Default.aspx?alias=denvergov.org/facilitiesplanning			
http://denvergov.org/Default.aspx?alias=denvergov.org/finance			

http://denvergov.org/Default.aspx?alias=denvergov.org/firedepartment			
http://denvergov.org/Default.aspx?alias=denvergov.org/general_services			
http://denvergov.org/Default.aspx?alias=denvergov.org/gis			
http://denvergov.org/Default.aspx?alias=denvergov.org/jobs			
http://denvergov.org/Default.aspx?alias=denvergov.org/humanrights			
http://denvergov.org/Default.aspx?alias=denvergov.org/humanservices			
http://denvergov.org/Default.aspx?alias=denvergov.org/oim			
http://denvergov.org/Default.aspx?alias=denvergov.org/mayor			
http://denvergov.org/Default.aspx?alias=denvergov.org/motorvehicle			
http://denvergov.org/Default.aspx?alias=denvergov.org/nature_and_science_museum			
http://denvergov.org/Default.aspx?alias=denvergov.org/telecom			
http://www.denvergov.org/Default.aspx?alias=www.denvergov.org/parksandrecreation			
http://denvergov.org/Default.aspx?alias=denvergov.org/police			
http://denvergov.org/Default.aspx?alias=denvergov.org/publicworks			
http://denvergov.org/Default.aspx?alias=denvergov.org/purchasing			
http://denvergov.org/Default.aspx?alias=denvergov.org/safety			
http://denvergov.org/Default.aspx?alias=denvergov.org/sheriff			
http://denvergov.org/Default.aspx?alias=denvergov.org/technology_services			
http://denvergov.org/Default.aspx?alias=denvergov.org/theatres_and_arenas			
http://denvergov.org/Default.aspx?alias=denvergov.org/treasury			
http://denvergov.org/TabId/37910/TopicId/775/default.aspx			
http://denvergov.org/TabId/37910/TopicId/791/default.aspx			
http://denvergov.org/TabId/37910/TopicId/842/default.aspx			
http://denvergov.org/TabId/37910/TopicId/907/default.aspx			
http://denvergov.org/TabId/37910/TopicId/927/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1024/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1582/default.aspx			
http://denvergov.org/TabId/37910/TopicId/2073/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1170/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1198/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1234/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1279/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1105/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1320/default.aspx			
http://denvergov.org/TabId/37910/TopicId/973/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1399/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1466/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1513/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1066/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1548/default.aspx			
http://denvergov.org/TabId/37910/TopicId/1918/default.aspx			
http://www.denvergov.org/denvermaps/default.asp			
http://www.denvergov.org/redirect_404/tabid/367615/tabid/387714/Default.aspx?			

http://denvergov.org/Street_Maintenance/HomePage/tabid/394962/Default.aspx			
http://www.denvergov.org/Default.aspx?alias=www.denvergov.org/publicworks			
http://forecast.weather.gov/MapClick.php?CityName=Denver&state=CO&site=BOU			
http://denvergov.org/Assessor/TheRealPropertySection/tabid/378145/Default.aspx			
http://denvergov.org/DenverGovHome/tabid/37891/newsid97029/2135/Flu-Information/Default.aspx			
http://denvergov.org/DenverGovHome/tabid/37891/newsid97029/2135/Flu-Information/Default.aspx			
http://denvergov.org/DenverGovHome/tabid/37891/cmd97029/arch/Default.aspx			
http://denvergov.org/DenverGovHome/tabid/37891/Default.aspx			
http://denvergov.org/DesktopModules/Orizonti_NukeNews/getRSS.aspx?pid=0&tid=37891&mid=97029&cnt=10			
http://denvergov.org/DenverGovHome/tabid/37891/newsid97029/58/Denver-Update-Weekly-News-Summary/			
http://denvergov.org/DenverGovHome/tabid/37891/newsid97029/2110/Mayor-Names-Two-to-Administration/			
http://www.denvergov.org/Portals/0/documents/ConventionImpactReport.pdf			
http://denvergov.org/DenverGovHome/tabid/37891/newsid97029/2114/Denver-Census-2010			
http://denvergov.org/DenverGovHome/tabid/37891/newsid97029/1573/Innovative-Transportation			
http://denvergov.org/DenverGovHome/tabid/37891/newsid471011/2146/2009-Movies-in-the-Parks/			
http://denvergov.org/DenverGovHome/tabid/37891/newsid471011/2148/Library-Used-Book			
http://www.denvergov.org/recnew/NewsandEvents/tabid/425382/Default.aspx			
http://denvergov.org/DenverGovHome/tabid/37891/newsid471011/2147/Free-Public-Art-Tours-2009/			
http://denvergov.org/EconomicStimulus/tabid/433727/Default.aspx			
http://denvergov.org/DenverGovHome/tabid/37891/newsid471011/1635/Building-a-Better-Denver/			
http://denvergov.org/Default.aspx?alias=www.denvergov.org/betterDenver			
http://www.denvergov.org/Portals/0/documents/ConventionImpactReport.pdf			
http://www.denvergov.org/Portals/0/documents/ConventionImpactReport.pdf			
http://denvergov.org/DesktopModules/Orizonti_NukeNews/getRSS.aspx?pid=0&tid=37891&mid=471011&cnt=10			
http://denvergov.org/DenverGovHome/tabid/37891/cmd471011/arch/Default.aspx			
https://denver.311colorado.com/psp/311PROD/CUSTOMER/CUST/h/?tab=PAPP_GUEST			
http://www.flydenver.com/			
http://www.rtd-denver.com/			
http://www.denverconvention.com/			
http://www.denver.org/events			
http://www.denvergov.org/Default.aspx?alias=www.denvergov.org/parksandrecreation			
https://wmq.etimspayments.com/pbw/include/denver/input.jsp			
http://www.denvergov.org/tabid/37889/Default.aspx?link=http://www.denvergov.org/apps/policereport			
http://www.colorado.com/			
https://denver.311colorado.com/psp/311PROD/CUSTOMER/CUST/h/?cmd=logout			
http://www.denvergov.org/tabid/37889/Default.aspx?link=http://www.denvergov.org/apps/policereport			
http://www.denvergov.org/DenverPartnersAgainstGraffiti/Reportgraffitiforfreeremoval/tabid/426599/			
http://www.denvergov.org/recapp/NewCustomerSignup/tabid/425352/Default.aspx			
http://www.rtd-denver.com/			
http://www.flydenver.com/			
https://wmq.etimspayments.com/pbw/include/denver/input.jsp			
http://www.denvergov.org/AnimalControl/PetLicensing1/tabid/426838/Default.aspx			
http://www.denvergov.org//subscriber/subscription/tabid/37911/Default.aspx			

http://www.denvergov.org/redirect_404/tabid/37889/Default.aspx?link=http://www.denvergov.org/apps/nis			
http://www.denverwater.org/cons_xeriscape/conservation/summerwateringrestrictions.html			
http://www.denvergov.org/StreetSweepingReminders/tabid/429784/Default.aspx			
http://www.denvergov.org/Street_Maintenance/EFormReportaPothole/tabid/425073/Default.aspx			
https://pwwmd.denvergov.org/ipayment-client/payment			
https://denver.311colorado.com/psp/311PROD/CUSTOMER/CUST/h/?cmd=logout			
http://www.denvergov.org/tabid/37889/Default.aspx?link=http://www.denvergov.org/apps/policerreport			
http://www.denvergov.org/DenverPartnersAgainstGraffiti/Reportgraffitiforfreeremoval/tabid/426599/			
http://www.denvergov.org/DPW_Contract_Admin/HomePage/tabid/385456/Default.aspx			
http://www.denvergov.org/Permit_Services/DevelopersConsultants/tabid/391951/Default.aspx			
http://www.milehigh.com/business/business-assistance-center/Start-Your-Business/nine-steps			
http://www.denvergov.org//subscriber/subscription/tabid/37911/Default.aspx			
https://denver.311colorado.com/psp/311PROD/CUSTOMER/CUST/h/?cmd=logout			
http://denvergov.org/Default.aspx?alias=denvergov.org/denver8TV			
http://denvergov.org/Default.aspx?alias=denvergov.org/denver8tv			
http://www.denver.org/events			
http://www.denver.org/events			
https://denver.311colorado.com/psp/311PROD/CUSTOMER/CUST/h/?tab=PAPP_GUEST			
https://denver.311colorado.com/psp/311PROD/CUSTOMER/CUST/h/?cmd=logout			
http://flydenver.com/			
http://flydenver.com/			
http://denvergov.org/SiteFeedbackandTechnicalIssues/tabid/425445/Default.aspx			
http://denvergov.org/tabid/426737/Default.aspx			
http://denvergov.org/SitePolicies/tabid/367682/Default.aspx			
150 total	83 in dropdown	26 repeated	111 in first view

E-3: Boston Links

LINK	First Screenfull?	In Dropdown?	Unique?
http://www.cityofboston.gov/	Green	Red	Green
http://www.cityofboston.gov/	Green	Red	Red
http://www.cityofboston.gov/online_services/	Green	Red	Green
http://www.cityofboston.gov/residents/	Green	Red	Green
http://www.cityofboston.gov/business/	Green	Red	Green
http://www.cityofboston.gov/visitors/	Green	Red	Green
http://www.cityofboston.gov/students/	Green	Red	Green
http://www.cityofboston.gov/government/	Green	Red	Green
http://www.cityofboston.gov/online_services/	Green	Red	Green
http://www.cityofboston.gov/online_services/payments.asp	Green	Green	Green
http://www.bwsc.org/tab_menus/6frameset6.htm	Green	Green	Green
http://www.cityofboston.gov/boats/mooring/	Green	Green	Green
http://www.cityofboston.gov/boats/	Green	Green	Green
https://www.kelleyryan.com/epay/	Green	Green	Green
http://www.cityofboston.gov/excise/	Green	Green	Green
http://www.cityofboston.gov/realestate/	Green	Green	Green
http://www.cityofboston.gov/persproperty/	Green	Green	Green
http://www.cityofboston.gov/transportation/parkprogr.asp	Green	Green	Green
http://www.cityofboston.gov/parking/	Green	Green	Green
http://www.cityofboston.gov/online_services/fpaResCategory.asp	Green	Green	Green
http://www.cityofboston.gov/trac/forms.asp	Green	Green	Green
http://www.cityofboston.gov/isd/housing/	Green	Green	Green
http://www.cityofboston.gov/isd/building/	Green	Green	Green
http://www.cityofboston.gov/animalcontrol/dogapplication.asp	Green	Green	Green
http://www.cityofboston.gov/transportation/parkprogr.asp	Green	Green	Red
http://www.cityofboston.gov/registry/registerbirth.asp	Green	Green	Green
http://www.cityofboston.gov/online_services/reportsResCategory.asp	Green	Green	Green
http://www.cityofboston.gov/subscribe/	Green	Green	Green
Trash Recycling Guide (PDF) -- In Dropdown, can't get link	Green	Green	Green
Rental Housing Handbook (PDF) -- In Dropdown, can't get link	Green	Green	Green
Transportation Rules Book (PDF) -- In Dropdown, can't get link	Green	Green	Green
http://www.cityofboston.gov/BAR/	Green	Green	Green
http://www.cityofboston.gov/internships/	Green	Green	Green
http://www.bostonyouthzone.com/teenzone/employment/byf/	Green	Green	Green
http://www.bostonredevelopmentauthority.org/jobs/jobdesc.asp	Green	Green	Green
http://www.bphc.org/employment/default.asp	Green	Green	Green
http://www.bostonpublicschools.org/jobs/	Green	Green	Green
http://www.cityofboston.gov/ohr/careercenter.asp	Green	Green	Green
http://www.cityofboston.gov/contact/	Green	Red	Green
http://www.cityofboston.gov/contact/	Green	Red	Red

http://www.cityofboston.gov/contact/directions.asp			
http://www.cityofboston.gov/mayor/24/			
http://www.cityofboston.gov/government/cityDept.asp			
http://www.cityofboston.gov/AdministrationFinance/			
http://www.cityofboston.gov/animalcontrol/			
http://www.cityofboston.gov/animalcontrol/			
http://www.cityofboston.gov/archivesandrecords/			
http://www.cityofboston.gov/arts/			
http://www.cityofboston.gov/assessing/			
http://www.cityofboston.gov/auditing/			
http://www.cityofboston.gov/bikes/			
http://www.cityofboston.gov/isd/building/boa/			
http://www.cityofboston.gov/bcyf			
http://www.cityofboston.gov/brjp			
http://www.cityofboston.gov/bra			
http://www.cityofboston.gov/budget			
http://www.cityofboston.gov/cable			
http://www.cityofboston.gov/cityclerk			
http://www.cityofboston.gov/citycouncil			
http://www.cityofboston.gov/civilrights			
http://www.cityofboston.gov/consumeraffairs			
http://www.cityofboston.gov/elderly			
http://www.cityofboston.gov/elections			
http://www.cityofboston.gov/ems			
http://www.cityofboston.gov/HomelandSecurity			
http://www.cityofboston.gov/shelter			
http://www.cityofboston.gov/environment			
http://www.cityofboston.gov/environmentalandenergy			
http://www.cityofboston.gov/fjc			
http://www.cityofboston.gov/fire			
http://www.cityofboston.gov/jobs			
http://www.cityofboston.gov/humanservices			
http://www.cityofboston.gov/isd			
http://www.cityofboston.gov/intergovernmental			
http://www.cityofboston.gov/jcs			
http://www.cityofboston.gov/labor			
http://www.cityofboston.gov/law			
http://www.cityofboston.gov/library			
http://www.cityofboston.gov/licensing			
http://www.cityofboston.gov/mis			
http://www.cityofboston.gov/mayor			
http://www.bostonyouthzone.com/myc			
http://www.cityofboston.gov/dnd			

http://www.cityofboston.gov/neighborhoods			
http://www.cityofboston.gov/newbostonians			
http://www.cityofboston.gov/parking			
http://www.cityofboston.gov/parks			
http://www.cityofboston.gov/police			
http://www.cityofboston.gov/news			
http://www.cityofboston.gov/propertymanagement			
http://www.bphc.org			
http://www.cityofboston.gov/publicworks			
http://www.cityofboston.gov/purchasing			
http://www.cityofboston.gov/registry			
http://www.cityofboston.gov/rentalhousing			
http://www.cityofboston.gov/retirement			
http://www.cityofboston.gov/bps			
http://www.cityofboston.gov/slbe			
http://www.cityofboston.gov/trac			
http://www.cityofboston.gov/transportation			
http://www.cityofboston.gov/treasury			
http://www.cityofboston.gov/veterans			
http://www.cityofboston.gov/women			
http://www.cityofboston.gov/workerscomp			
http://www.bostonyouthzone.com/myc			
http://www.bostonyouthzone.com/teenzone/employment/byf			
http://www.cityofboston.gov/assessing/search			
http://www.cityofboston.gov/OHR			
http://www.cityofboston.gov/maps			
http://www.cityofboston.gov/parking			
http://www.cityofboston.gov/myneighborhood			
http://www.cityofboston.gov/visitors/thingstodo.asp			
http://www.cityofboston.gov/contact/			
http://www.cityofboston.gov/notification			
http://www.cityofboston.gov/neighborhoods/bostonshines.asp			
http://www.cityofboston.gov/publicworks/sweeping/			
http://www.cityofboston.gov/publicworks/potholes.asp			
http://www.bostonyouthzone.com/myc			
http://www.cityofboston.gov/recovery			
http://www.cityofboston.gov/environment/harbordiscoveries.asp			
http://www.cityofboston.gov/BAR			
http://www.cityofboston.gov/news/default.aspx?id=4113			
http://www.cityofboston.gov/residents/			
http://www.cityofboston.gov/residents/housingAndProperty.asp			
http://www.cityofboston.gov/residents/neighborhoods.asp			
http://www.cityofboston.gov/residents/electionsandvoting.asp			

http://www.cityofboston.gov/residents/			
http://www.cityofboston.gov/business/			
http://www.cityofboston.gov/business/str_bus.asp			
http://www.cityofboston.gov/business/lp.asp			
http://www.cityofboston.gov/business/eco_dev.asp			
http://www.cityofboston.gov/business			
http://www.cityofboston.gov/visitors			
http://www.cityofboston.gov/visitors/about.asp			
http://www.cityofboston.gov/visitors/thingstodo.asp			
http://www.cityofboston.gov/freedomtrail/			
http://www.cityofboston.gov/visitors/			
http://www.cityofboston.gov/students/			
http://www.cityofboston.gov/students/Schoolscollegesanduniversities.asp			
http://www.cityofboston.gov/students/highschoolstudents.asp			
http://www.onein3boston.org/			
http://www.cityofboston.gov/students/			
http://www.cityofboston.gov/copyright/privacyandsecurity.asp			
http://www.cityofboston.gov/calendar/			
http://www.cityofboston.gov/calendar/			
http://www.cityofboston.gov/calendar/			
http://www.cityofboston.gov/mayor			
http://www.cityofboston.gov/news/default.aspx?dept=55			
http://www.cityofboston.gov/mayor/weekly.asp			
http://www.cityofboston.gov/mayor/priorities.asp			
http://www.cityofboston.gov/mayor/bio.asp			
http://www.cityofboston.gov/citycouncil			
http://www.cityofboston.gov/citycouncil/			
http://www.cityofboston.gov/calendar/citycouncil.asp			
http://www.cityofboston.gov/citycouncil/districts.asp			
http://www.cityofboston.gov/citycouncil/committees.asp			
http://www.cityofboston.gov/news/			
http://www.cityofboston.gov/news/default.aspx?id=4151			
http://www.cityofboston.gov/news/default.aspx?id=4150			
http://www.cityofboston.gov/news/default.aspx?id=4149			
http://www.cityofboston.gov/news/default.aspx?id=4147			
http://www.cityofboston.gov/news/rss.asp			
http://www.facebook.com/cityofboston			
http://www.mass.gov/			
http://www.usa.gov/			
http://www.adobe.com/			
http://www.adobe.com/			
167 total	116 in first view	92 in dropdown	27 repeated

E-4: Template Links

Link	In Dropdown?	Unique?	First Screenfull?
http://users.wpi.edu/~mro/boston/index2.html			
http://users.wpi.edu/~mro/boston/index2.html			
http://users.wpi.edu/~mro/boston/online_services.html			
http://www.cityofboston.gov/online_services/payments.asp			
http://www.cityofboston.gov/parking/			
http://www.cityofboston.gov/transportation/parkprogr.asp			
http://www.cityofboston.gov/persproperty/			
http://www.cityofboston.gov/realestate/			
http://www.cityofboston.gov/excise/			
https://www.kelleyryan.com/epay/			
http://www.cityofboston.gov/boats/			
http://www.cityofboston.gov/boats/mooring/			
http://www.bwsc.org/tab_menus/6frameset6.htm			
http://users.wpi.edu/~mro/boston/online_services.html			
http://www.cityofboston.gov/online_services/payments.asp			
http://www.cityofboston.gov/online_services/fpaResCategory.asp			
http://www.cityofboston.gov/registry/registerbirth.asp			
http://www.cityofboston.gov/transportation/parkprogr.asp			
http://www.cityofboston.gov/animalcontrol/dogapplication.asp			
http://www.cityofboston.gov/isd/building/			
http://www.cityofboston.gov/isd/housing/			
http://www.cityofboston.gov/trac/forms.asp			
http://www.cityofboston.gov/online_services/fpaResCategory.asp			
http://www.cityofboston.gov/online_services/reportsResCategory.asp			
http://www.cityofboston.gov/BAR/			
http://www.cityofboston.gov/transportation/pdfs/rules.pdf			
http://www.cityofboston.gov/rentalhousing/pdfs/handbook.pdf			
http://www.cityofboston.gov/TridionImages/recycling_guide_tcm1-1550.pdf			
http://www.cityofboston.gov/subscribe/			
http://www.cityofboston.gov/online_services/reportsResCategory.asp			
http://www.cityofboston.gov/ohr/careercenter.asp			
http://www.bostonpublicschools.org/jobs/			
http://www.bphc.org/employment/default.asp			
http://www.bostonredevelopmentauthority.org/jobs/jobdesc.asp			
http://www.bostonyouthzone.com/teenzone/employment/byf/			
http://www.cityofboston.gov/internships/			
http://users.wpi.edu/~mro/boston/residents.html			
http://www.cityofboston.gov/residents/housingAndProperty.asp			
http://www.cityofboston.gov/residents/neighborhoods.asp			
http://www.cityofboston.gov/residents/electionsandvoting.asp			

http://users.wpi.edu/~mro/boston/residents.html			
http://users.wpi.edu/~mro/boston/business.html			
http://www.cityofboston.gov/business/str_bus.asp			
http://www.cityofboston.gov/business/lp.asp			
http://www.cityofboston.gov/business/eco_dev.asp			
http://users.wpi.edu/~mro/boston/business.html			
http://users.wpi.edu/~mro/boston/visitors.html			
http://www.cityofboston.gov/visitors/about.asp			
http://www.cityofboston.gov/visitors/thingstodo.asp			
http://www.cityofboston.gov/freedomtrail/			
http://users.wpi.edu/~mro/boston/visitors.html			
http://users.wpi.edu/~mro/boston/students.html			
http://www.cityofboston.gov/students/Schoolscollegesanduniversities.asp			
http://www.cityofboston.gov/students/highschoolstudents.asp			
http://www.onein3boston.org/			
http://users.wpi.edu/~mro/boston/students.html			
http://users.wpi.edu/~mro/boston/government.html			
http://www.cityofboston.gov/mayor/			
http://www.cityofboston.gov/citycouncil/			
http://www.cityofboston.gov/cityclerk/			
http://www.cityofboston.gov/government/citydept.asp			
http://www.cityofboston.gov/ohr/			
http://users.wpi.edu/~mro/boston/contact.html			
http://users.wpi.edu/~mro/boston/contact.html			
http://www.cityofboston.gov/contact/directions.asp			
http://www.cityofboston.gov/mayor/24/			
http://www.cityofboston.gov/calendar/			
http://www.cityofboston.gov/calendar/			
http://www.cityofboston.gov/calendar/			
http://www.cityofboston.gov/government/cityDept.asp			
http://www.cityofboston.gov/AdministrationFinance/			
http://www.cityofboston.gov/animalcontrol/			
http://www.cityofboston.gov/animalcontrol/			
http://www.cityofboston.gov/archivesandrecords/			
http://www.cityofboston.gov/arts/			
http://www.cityofboston.gov/assessing/			
http://www.cityofboston.gov/auditing/			
http://www.cityofboston.gov/bikes/			
http://www.cityofboston.gov/isd/building/boa/			
http://www.cityofboston.gov/bcyf/			
http://www.cityofboston.gov/brjp/			
http://www.bostonredevelopmentauthority.org/			
http://www.cityofboston.gov/budget/			

http://www.cityofboston.gov/cable/			
http://www.cityofboston.gov/cityclerk/			
http://www.cityofboston.gov/citycouncil/			
http://www.cityofboston.gov/civilrights/			
http://www.cityofboston.gov/consumeraffairs/			
http://www.cityofboston.gov/elderly/			
http://www.cityofboston.gov/elections/			
http://www.cityofboston.gov/ems/			
http://www.cityofboston.gov/moep/			
http://www.cityofboston.gov/shelter/			
http://www.cityofboston.gov/environment/			
http://www.cityofboston.gov/environmentalandenergy/			
http://www.cityofboston.gov/fjc/			
http://www.cityofboston.gov/fire/			
http://www.cityofboston.gov/ohr/			
http://www.cityofboston.gov/humanservices/			
http://www.cityofboston.gov/isd/			
http://www.cityofboston.gov/intergovernmental/			
http://www.cityofboston.gov/jcs/			
http://www.cityofboston.gov/labor/			
http://www.cityofboston.gov/law/			
http://www.cityofboston.gov/library/			
http://www.cityofboston.gov/licensing/			
http://www.cityofboston.gov/mis/			
http://www.cityofboston.gov/mayor/			
http://www.bostonyouthzone.com/myc/			
http://www.cityofboston.gov/dnd/			
http://www.cityofboston.gov/neighborhoods/			
http://www.cityofboston.gov/newbostonians/			
http://www.cityofboston.gov/parking/			
http://www.cityofboston.gov/parks/			
http://www.cityofboston.gov/police/			
http://www.cityofboston.gov/news/			
http://www.cityofboston.gov/propertymanagement/			
http://www.bphc.org/Pages/Home.aspx			
http://www.cityofboston.gov/publicworks/			
http://www.cityofboston.gov/purchasing/			
http://www.cityofboston.gov/registry/			
http://www.cityofboston.gov/rentalhousing/			
http://www.cityofboston.gov/retirement/			
http://www.cityofboston.gov/bps/			
http://www.cityofboston.gov/slbe/			
http://www.cityofboston.gov/trac/			

http://www.cityofboston.gov/transportation/	Green	Green	Green
http://www.cityofboston.gov/treasury/	Green	Green	Green
http://www.cityofboston.gov/veterans/	Green	Green	Green
http://www.cityofboston.gov/women/	Green	Green	Green
http://www.cityofboston.gov/workerscomp/	Green	Green	Green
http://www.bostonyouthzone.com/myc/	Green	Red	Green
http://www.bostonyouthzone.com/teenzone/employment/byf/	Green	Red	Green
http://www.cityofboston.gov/assessing/search/	Red	Green	Green
http://www.cityofboston.gov/OHR/	Red	Red	Green
http://www.cityofboston.gov/maps/	Red	Green	Green
http://www.cityofboston.gov/parking/	Red	Red	Green
http://www.cityofboston.gov/myneighborhood/	Red	Green	Green
http://www.cityofboston.gov/visitors/thingstodo.asp	Red	Red	Green
http://www.cityofboston.gov/mayor/	Red	Red	Green
http://www.cityofboston.gov/news/	Red	Red	Green
http://www.cityofboston.gov/mayor/weekly.asp	Red	Green	Green
http://www.cityofboston.gov/mayor/priorities.asp	Red	Green	Green
http://www.cityofboston.gov/mayor/bio.asp	Red	Green	Red
http://www.cityofboston.gov/citycouncil/	Red	Red	Red
http://www.cityofboston.gov/citycouncil/	Red	Red	Red
http://www.cityofboston.gov/calendar/citycouncil.asp	Red	Green	Red
http://www.cityofboston.gov/citycouncil/districts.asp	Red	Green	Red
http://www.cityofboston.gov/citycouncil/committees.asp	Red	Green	Red
http://www.cityofboston.gov/neighborhoods/bostonshines.asp	Red	Green	Green
http://users.wpi.edu/~mro/boston/story_main.html	Red	Green	Green
http://www.cityofboston.gov/publicworks/sweeping/	Red	Green	Red
http://users.wpi.edu/~mro/boston/story_1.html	Red	Green	Red
http://www.bostonyouthzone.com/MYC/	Red	Green	Red
http://users.wpi.edu/~mro/boston/story_2.html	Red	Green	Red
http://www.cityofboston.gov/publicworks/potholes.asp	Red	Green	Red
http://users.wpi.edu/~mro/boston/story_3.html	Red	Green	Red
http://www.bostonusa.com/	Red	Green	Red
http://www.cityofboston.gov/news/	Red	Red	Red
http://users.wpi.edu/~mro/boston/story_5.html	Red	Green	Red
http://www.cityofboston.gov/budget/recovery.asp	Red	Green	Red
http://users.wpi.edu/~mro/boston/story_6.html	Red	Green	Red
http://www.cityofboston.gov/news/rss.asp	Red	Green	Green
http://www.facebook.com/cityofboston	Red	Green	Green
http://www.youtube.com/user/BostonCable	Red	Green	Green
http://www.cityofboston.gov/alerts/	Red	Green	Green
http://www.cityofboston.gov/cable/video_library.asp	Red	Green	Green
http://www.cityofboston.gov/cable/video_library.asp	Red	Red	Green
http://www.cityofboston.gov/news/	Red	Red	Green

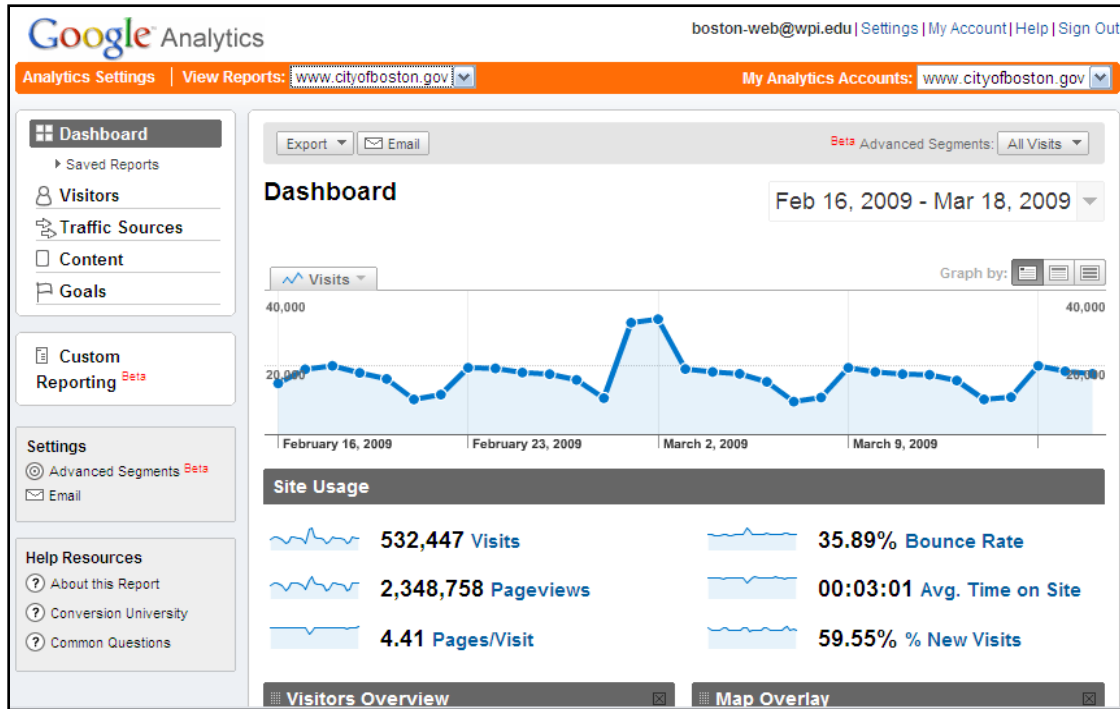
http://www.cityofboston.gov/news/default.aspx?id=4177			
http://www.cityofboston.gov/news/default.aspx?id=4176			
http://www.cityofboston.gov/news/default.aspx?id=4175			
http://www.mass.gov/?pageID=mg2homepage&L=1&LO=Home&sid=massgov2			
http://www.usa.gov/			
http://www.adobe.com/			
http://www.adobe.com/			
176 total	121 in dropdown	33 repeated	152 in first view

E-5: Metrics Summary

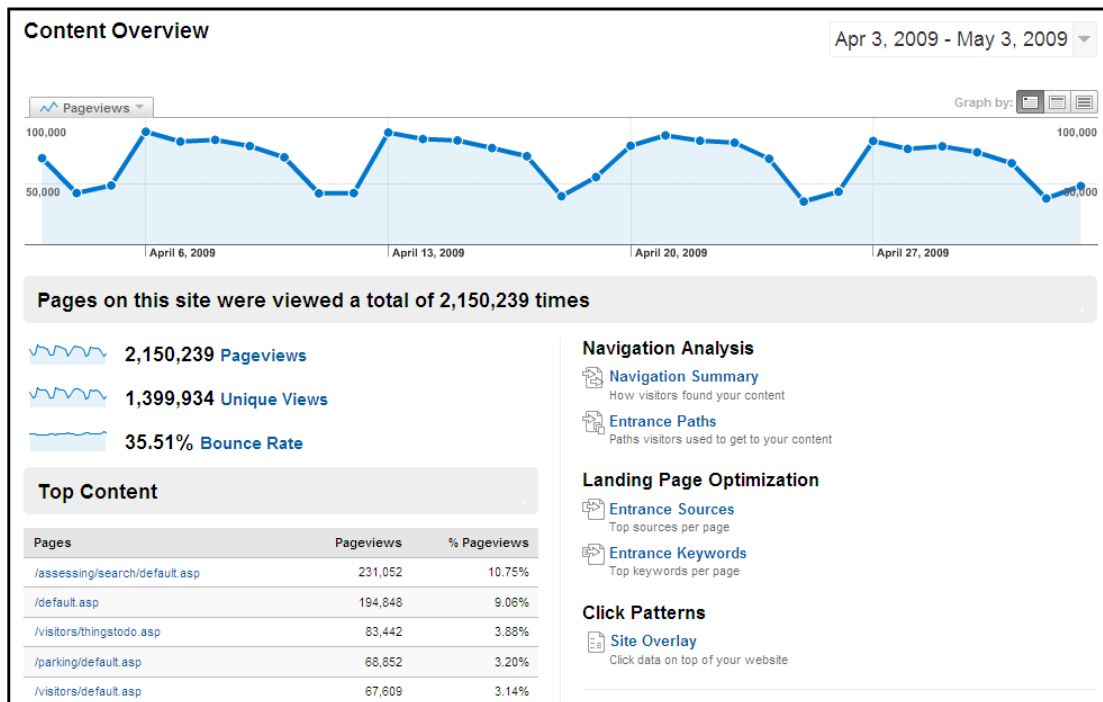
Metric	San Diego	Denver	Boston	Template
Total Links	172	150	167	176
Repeated Links	60 (35%)	26 (17%)	27 (16%)	33 (19%)
Unique Links	112 (65%)	124 (83%)	140 (84%)	143 (81%)
Links Without Scrolling	37 (22%)	111 (74%)	116 (69%)	152 (86%)
Number of Pictures	54	27	58	37
Page Size	215 KB	394 KB	390 KB	165 KB

F-1: Google Analytics

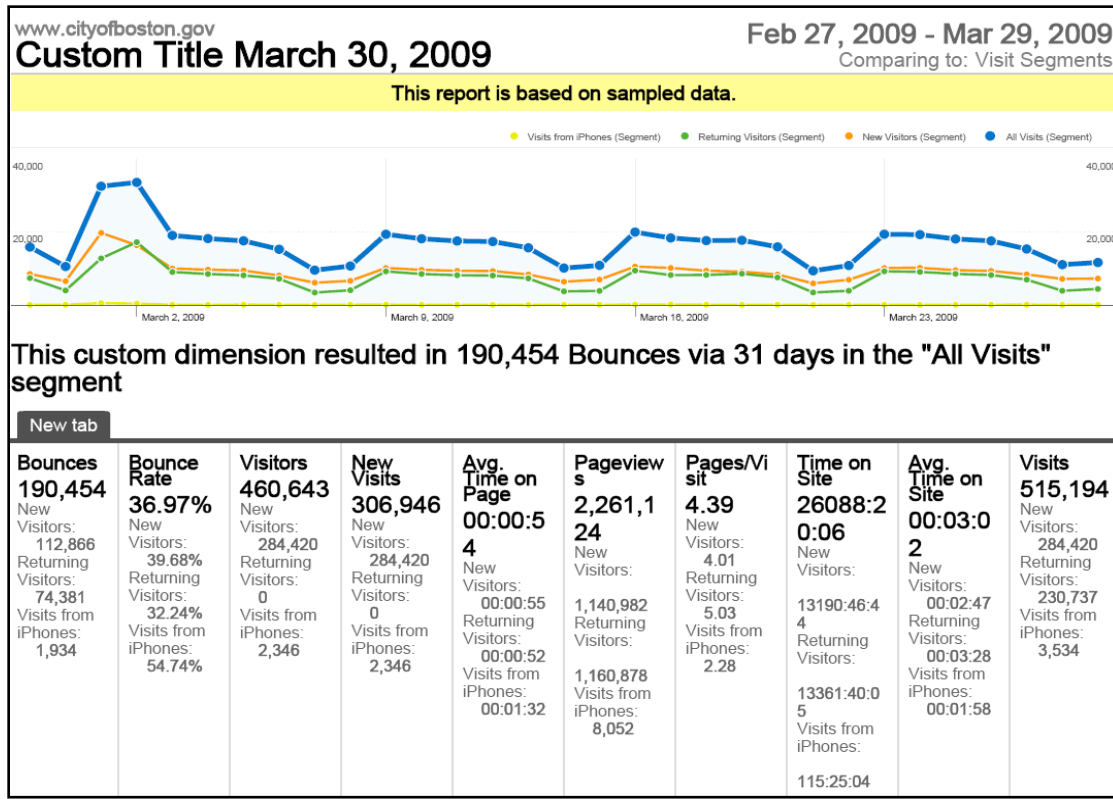
Analytics Overview:



Content Overview (Top Pages):



Statistics of Different Types of Users:



Screen Resolution Information:

480,930 visits used 622 screen resolutions

