

Venkatesh, V., Hoehle, H., and Aljafari, R., “A Usability Study of the Obamacare Website: Evaluation and Recommendations,” *Government Information Quarterly* (34:2), 2017, 199-210.

**** Final published version will be subject to copyediting and other editorial changes for style and format ****

A USABILITY STUDY OF THE OBAMACARE WEBSITE: EVALUATION AND RECOMMENDATIONS

Abstract

We conducted a usability study of the healthcare.gov website, popularly known as the Obamacare website, using the guidelines available on usability.gov, which were published by the Department of Health and Human Services. The study was conducted among 374 citizens. We found that the interface design, which we conceptualized as 16 dimensions, was rated rather low. Specifically, five dimensions of usability emerged as key to the prediction of overall usability of the website: hardware and software, home page, screen, scrolling and paging, and user experience. We also found that citizen satisfaction and intention to use the website were rated poorly. Based on a break down by gender, age and voting behavior (for Obama or not), we found several interesting patterns of differences. Ultimately, even if the infrastructure issues that have received a bulk of the media attention are miraculously resolved, our findings suggest that the site will be found wanting. The article offers specific illustrative examples of usability problems with the website and specific recommendations drawn from usability.gov. In addition to the practical implications for Obamacare, the article offers significant implications for researchers who seek to evaluate the usability of websites in general and healthcare websites in particular.

1. Introduction

From its inception, Obamacare and the associated website, healthcare.gov, has been an ambitious e-government initiative that seeks to facilitate health insurance services for millions of Americans. It would be an understatement to say that the website has had a rough start. Although opinions vary on the nature of the website problems, they all agree that such problems could have been avoided with further testing. Contractors in charge of building the website testified that the administration went with the launch of the website despite insufficient testing (Somashekhar & Goldstein, 2013). In particular, a complete end-to-end testing had not been properly conducted (Pear, 2013). Assuming that time was an important factor in launching the website and that agile methods have been adopted, careful testing would still be important to meet the citizens' needs (Kude, Bick, Schmidt, & Heinzl, 2014; Kude & Dibbern, 2009; Kude, Dibbern, & Heinzl, 2012). As more issues unfold, launching a complete functioning website by the end of November 2013, as originally promised, was deemed unrealistic (Dwyer, 2013) and latest reports reveal that although few navigation issues improved, the website continues to have problems.

The scope and nature of healthcare.gov offer an interesting opportunity to learn from the government's experience in healthcare. From a technological perspective, press reports and experts analyzing the website seem to cluster into two main problem areas: interface design and integration/infrastructure issues coupled with the hiring of incompetent vendors, such as CGI Global (Ferenstein, 2013). The integration issues have attracted much more of the media attention. Integration/infrastructure issues relate to data storage, telecommunications, and interoperability among different systems that communicate with healthcare.gov.

Interface design issues have been the cause of a great share of the website's poor performance since its launch. Interface design issues concern a wide range of usability factors, such as the user experience, navigation and content (Donker-Kuijer, de Jong, & Lentz, 2010; Elling, Lentz, Jong, & Bergh, 2012; Huang & Benyoucef, 2014; Shareef, Dwivedi, Kumar, & Kumar, 2016; Thong, Hong, & Tam, 2006; Venkatesh, Hoehle, & Aljafari, 2014; Youngblood & Mackiewicz, 2012). Interface design issues have also contributed to citizens' problems with the website (Brown, Venkatesh, & Goyal, 2012; Dwyer, 2013; Hu, Al-Gahtani, & Hu, 2014; Hu & Hui, 2012; Thong, Hong, & Tam, 2002). For example, it may not be clear to users that there is content below the virtual page fold, depending on the resolution with which users view the main page (Cardello, 2013). Error messages do not point out the specific issue that caused the error so that users can fix it easily (Cardello, 2013). Furthermore, instructions and content did not consider low-literacy readers (Cardello, 2013). The content was not adequately streamlined (Shah, 2013). One study (Tomlin, 2013) recruited real users of healthcare.gov and in a user experience test found several user experience issues, such as difficulty in finding information about plans and costs, creating logins and using the chat feature. Navigation was an issue as users needed to click many times to get the information that they need (Shah, 2013). Wong et al. (2014) observed 33 young adults and reported their experience with healthcare.gov. The analysis revealed several issues in the content, such as the need for better explanations of healthcare insurance terminology, affordability provisions for qualifying customers, and options for adult dental coverage (Wong et al., 2014). Overall, the noted recent reports on interface design issues provide interesting insights about the user experience with healthcare.gov. However, these reports are usually based on small sample sizes and/or rely heavily on observations and interviews, which might limit the breadth and depth of the examined usability issues. This trend

in analyzing usability issues with e-government websites is understandable given the lack of contextualized usability methods and instruments (Bertot & Jaeger, 2006; de Roiste, 2013; Velsen, Geest, Hedde, & Derks, 2009).

Against this backdrop, when we consider the use of websites, critical drivers include not only basic usability, which is defined by the International Standards Organization as the extent to which a website can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use (Venkatesh & Ramesh, 2006), but also contextualized usability. Specifically, whether extensive usability testing was conducted on the Obamacare website is a potential open question but perhaps more important is the question of whether the website developers listened to the government itself so to speak. Usability.gov is a government website that provides guidelines for developing usable websites. According to the usability.gov site, it "...is the leading resource for user experience (UX) best practices and guidelines, serving practitioners and students in the government and private sectors." Hence, we apply the usability.gov standards to (a) evaluate the usability of healthcare.gov; and (b) improve our understanding of usability in the context of large scale e-government applications. We tackle the following question: *"based on the usability.gov standards, what are the most important drivers of overall usability, citizen satisfaction, and intention to use in the context of large-scale e-government applications?"*

In the context of large scale e-government applications, which are rapidly gaining popularity as a key way of connecting government to citizens and delivering government services to citizens, usability of websites can drive citizens' trust in the services, government and even overall satisfaction with the government and its services (Brown, Fuller, & Vician, 2004;

Chan et al. 2010).¹ In for-profit organizations, usability of websites are known drivers of various outcomes, such as online retail sales, brand image and continued intention to shop on a site (Rai, Chen, Pye, & Baird, 2013; Rai & Tang, 2014). Well-designed sites, e.g., Amazon, have complemented an effective business strategy to deliver business success. Other relevant technological characteristics, such as compatibility, are important drivers of intention to adopt technology in business-to-business contexts (Fosso Wamba, Gunasekaran, Bhattacharya, & Dubey, 2016). Thus, we build on the existing body of knowledge about usability, with an emphasis on large-scale e-government applications.

The rest of the paper is organized as follows. In the next section, we describe our research approach to evaluate the usability of healthcare.gov based on the usability.gov standards. Then, we present our major findings and provide an illustration of the usability problems based on our findings. Finally, we conclude the paper with a summary of the major findings and implications for practice.

2. Research Approach

We adapted the guidelines provided on usability.gov, published by the U.S. Department of Health and Human Services (U.S. Department of Health and Human Services, 2006), to develop a conceptualization and associated survey instrument to assess the usability of healthcare.gov. This approach is consistent with previous work using the Microsoft guidelines (Agarwal & Venkatesh, 2002) to evaluate several organizational websites (Agarwal & Venkatesh, 2002; Venkatesh & Agarwal, 2006), including mobile sites (Venkatesh & Ramesh, 2006), and the Apple guidelines for mobile device sites (Hoehle & Venkatesh, 2015). Our

¹ Members of the author team of the current paper have developed usability instruments and conducted tests of numerous websites over the years—these works have appeared in leading academic and practitioners outlets (Agarwal & Venkatesh, 2002; Hoehle & Venkatesh, 2015; Venkatesh & Agarwal, 2006; Venkatesh et al. 2003; Venkatesh et al., 2014; Venkatesh & Ramesh, 2006).

research approach builds on existing e-government research that adopts technology acceptance (e.g., Hung, Chang, & Yu, 2006; Powell, Williams, Bock, Doellman, & Allen, 2012; Rana, Dwivedi, Williams, & Weerakkody, 2016; Zuiderwijk, Janssen, & Dwivedi, 2015), diffusion of innovations (e.g., Fosso Wamba & Edwards, 2014), and social cognitive approaches (e.g., Rana & Dwivedi, 2015) by suggesting a nuanced view of usability.

The HHS usability guidelines comprise 18 chapters that focus on optimizing the user experience of websites and most chapters include recommendations for developers. We developed the instrument by reviewing and coding the guidelines (for a detailed description of the coding procedures, see Hoehle and Venkatesh 2015) and excluded two chapters from the HHS usability guidelines (chapter 1 and chapter 18) from our instrument because these chapters focused on the usability testing and evaluation rather than providing actionable recommendations for improving the usability of websites (Venkatesh et al., 2014). We also reviewed literature on website usability. We related the information derived from the HHS usability guidelines to the literature identified and found support for the information derived from the HHS usability guidelines (for details regarding the coding procedures, see Hoehle and Venkatesh 2015). Based on our earlier study (Venkatesh et al., 2014), we defined 16 dimensions of representing the usability of websites that are shown in Table 1.

Table 1. List of usability dimensions based on usability.gov guidelines

Dimensions	Definition
User experience	The degree to which a user perceives that the website.....
Access	...facilitates and encourages effective and efficient interactions.
Hardware and software	...facilitates access to relevant information.
Home page	...accommodates to different hardware and software settings (e.g., operating systems, browsers, screens)
Page layout	...has a home page that is well constructed.
Navigation	...has a structure of pages that facilitates comprehension.
Scrolling and paging	...allows finding and accessing information effectively and efficiently.
Headings, titles and labels	...allows moving within a page and across pages efficiently.
Links	...uses descriptive headings, titles, and labels.
Text	...uses meaningful link labels and consistent clickability cues.
List	...communicates text effectively.
	...uses clear, meaningful, and descriptive lists.

Dimensions	Definition
Screen	...uses familiar screen-based controls in a conventional manner.
Graphs	...uses graphics appropriately.
Content	...provides needed information.
Content organization	...presents information that is clearly organized.
Search	...uses appropriate and useful search mechanisms.

To measure these constructs, we developed 205 survey questions (items) that captured the key aspects of website usability. In order to evaluate the effectiveness of website usability instrument, we identified citizen satisfaction and intention to use as outcome variables and adapted measures from previous research (Venkatesh, Chan, & Thong, 2012; Venkatesh, Morris, Davis, & Davis, 2003). Intention to use is a critical indicator of success of newly implemented information technologies and associated services (Hu, Brown, Thong, Chan, & Tam, 2009; Hu, Hsu, Hu, & Chen, 2010; Rana & Dwivedi, 2015). We also adapted an overall measure of website usability from W3C (W3C, 2013). This led to a pool of 241 questions in our survey. The approach that we followed in designing the survey instrument is consistent with our previously published academic works (Hoehle & Venkatesh, 2015; Venkatesh & Agarwal, 2002; Venkatesh, & Ramesh, 2006; Venkatesh et al., 2014).

In order to collect data, we created a survey including instructions for the participants and the items developed. All items were measured using a 7-point Likert-agreement scale (1=strongly disagree... 7=strongly agree). Data were collected from U.S. citizens recruited by a market research firm during the 3rd week of November 2013. We obtained 374 usable responses (58% women) that were all collected within one week. Of the 374 respondents, 144 indicated that they had accessed healthcare.gov before completing the survey, with 18 of them noting that they had purchased healthcare insurance through healthcare.gov. In order to identify the most significant usability dimensions, we used partial least squares (PLS), a component-based structural equation modeling technique that aims to maximize the variance explained in

estimating the specified model. The software package we used was Smart-PLS 2.0 (Ringle, Sven, & Alexander, 2005).

3. Findings

We first examined which of the 16 dimensions were important in terms of citizens' satisfaction with the website and their likelihood to continue to use the website. Five dimensions emerged as statistically significant: hardware and software, home page, screen, scrolling and paging, and user experience. The remaining analyses focused on these five dimensions along with overall usability, citizen satisfaction, and continued intention to use the website. We provide the average rating of the noted dimensions as our prior work did not find major differences based on other factors, such as voting behavior (Venkatesh et al., 2014)

Table 2 shows the overall descriptive statistics (means and standard deviations). It is evident that the website does not appear to be particularly acceptable to citizens.

Table 2. Evaluations of the website			
		Mean	SDev
Outcomes	Citizen satisfaction	3.86	0.74
	Intention to use	3.70	2.07
	Overall usability	4.69	1.29
Usability dimensions	Home page	4.99	1.26
	Hardware and software	5.19	1.38
	Screen	4.94	1.31
	Scrolling	4.94	1.33
	User experience	4.89	1.26

We next examined if there were systematic differences among those who were Obama supporters vs. not—as defined by whether they voted for Obama in 2012 (Table 3). Although those who did not vote for Obama are more critical of the website, even his backers from 2012 do not appear to be highly favorable—all means in that group were only a little over 5 on a 7-point scale.

Table 3. Voting behavior breakdown					
		Obama 2012		No Obama 2012	
		Mean	SDev	Mean	SDev
Outcomes	Citizen satisfaction	3.86	0.75	3.87	0.74

Usability dimensions	Intention to use	4.12	2.09	3.07	1.89
	Overall usability	5.03	1.09	4.18	1.41
	Home page	5.29	1.07	4.56	1.41
	Hardware and software	5.49	1.20	4.76	1.53
	Screen	5.24	1.11	4.51	1.47
	Scrolling	5.17	1.14	4.60	1.52
	User experience	5.19	1.10	4.44	1.38
n		226		148	

The demographic breakdown by gender and age are shown in Tables 4 through 6, with Table 6 showing the break down by both gender and age. Table 4 reveals that there are only small differences between women and men, with women rating the website higher. Likewise, Table 5 shows little differences between those who are under 30 and those who are older. When combined (gender and age), the pattern is similar, shown in Table 6, with the two groups of men providing lower evaluations.

Table 4. Gender breakdown

		Women		Men	
		Mean	SDev	Mean	SDev
Outcomes	Citizen satisfaction	3.82	0.76	3.92	0.72
	Intention to use	3.57	2.09	3.87	2.04
	Overall usability	4.77	1.34	4.60	1.22
Usability dimensions	Home page	5.11	1.29	4.84	1.23
	Hardware and software	5.34	1.35	5.00	1.42
	Screen	5.02	1.38	4.85	1.22
	Scrolling	5.10	1.36	4.73	1.27
	User experience	5.02	1.28	4.73	1.23
n		217		157	

Table 5. Age breakdown

		Under 30		Above or equal to 30	
		Mean	SDev	Mean	SDev
Outcomes	Citizen satisfaction	3.79	0.74	3.97	0.74
	Intention to use	3.68	1.99	3.72	2.20
	Overall usability	4.71	1.24	4.68	1.37
Usability dimensions	Home page	4.99	1.27	5.01	1.27
	Hardware and software	5.16	1.37	5.24	1.41
	Screen	4.93	1.30	4.98	1.34
	Scroll	4.93	1.34	4.97	1.33
	User experience	4.89	1.24	4.91	1.31
n		239		135	

Table 6. Gender and age breakdown

		Women Under 30		Men Under 30		Women above or equal to 30		Men above or equal to 30	
		Mean	SDev	Mean	SDev	Mean	SDev	Mean	SDev
Outcomes	Citizen satisfaction	3.76	0.75	3.83	0.73	3.92	0.78	4.02	0.69
	Intention to use	3.54	2.01	3.90	1.94	3.62	2.21	3.86	2.18

Usability dimensions	Overall usability	4.77	1.27	4.62	1.20	4.76	1.46	4.57	1.25
	Home page	5.10	1.29	4.82	1.22	5.13	1.29	4.86	1.25
	Hardware and software	5.30	1.37	4.96	1.36	5.40	1.33	5.06	1.50
	Screen	5.00	1.34	4.82	1.23	5.05	1.44	4.89	1.22
	Scroll	5.05	1.35	4.73	1.31	5.17	1.38	4.73	1.23
	User experience	5.03	1.26	4.68	1.18	5.01	1.32	4.78	1.30
n		134		87		83		70	

Tables 7 and 8 overlay 2012 voting behavior over gender and age respectively. Table 7 suggests that men who did not vote for Obama in 2012 are the harshest in their evaluations and the women who voted for Obama in 2012 are the most favorable. Table 8 suggests that among those who voted for Obama in 2012, older citizens were more favorable toward the website and the poorest evaluations come from the older citizens who did not vote for Obama.

Table 7. Gender and voting behavior breakdown

		Obama 2012/Women		No Obama 2012/Women		Obama 2012/Men		No Obama 2012/Men	
		Mean	SDev	Mean	SDev	Mean	SDev	Mean	SDev
Outcomes	Citizen satisfaction	3.80	0.76	3.85	0.77	3.94	0.73	3.89	0.69
	Intention to use	3.96	2.14	2.95	1.84	4.37	1.98	3.22	1.95
	Overall usability	5.06	1.13	4.29	1.52	4.99	1.03	4.04	1.27
Usability dimensions	Home page	5.36	1.10	4.71	1.45	5.18	1.01	4.36	1.35
	Hardware and software	5.55	1.21	5.00	1.50	5.40	1.19	4.44	1.53
	Screen	5.29	1.16	4.61	1.58	5.17	1.05	4.39	1.32
	Scroll	5.28	1.19	4.80	1.56	5.01	1.05	4.34	1.45
	User experience	5.27	1.12	4.62	1.42	5.08	1.06	4.21	1.29
n		134		83		92		65	

Table 8. Age and voting behavior breakdown

		Obama 2012/Under 30		No Obama 2012/ Under 30		Obama 2012/above or equal to 30		No Obama 2012/above or equal to 30	
		Mean	SDev	Mean	SDev	Mean	SDev	Mean	SDev
Outcomes	Citizen satisfaction	3.82	0.78	3.74	0.67	3.90	0.71	4.08	0.79
	Intention to use	4.13	2.03	3.06	1.76	4.11	2.17	3.07	2.10
	Overall usability	4.96	1.13	4.38	1.32	5.13	1.04	3.84	1.51
Usability dimensions	Home page	5.21	1.13	4.68	1.38	5.38	0.98	4.35	1.47
	Hardware and software	5.38	1.28	4.87	1.44	5.62	1.07	4.58	1.67
	Screen	5.15	1.19	4.64	1.39	5.36	1.00	4.30	1.59
	Scrolling	5.08	1.23	4.72	1.46	5.30	1.01	4.39	1.62
	User experience	5.11	1.15	4.59	1.30	5.31	1.01	4.19	1.48
n		128		93		98		55	

Table 9. Gender, age, and voting behavior breakdown

		Women/ Under 30/ Obama 2012		Women/ Under 30/ No Obama 2012		Men/ Under 30/ Obama 2012		Men/ Under 30/ No Obama 2012		Women/ above or equal to 30/Obama 2012		Women/ above or equal to 30/No Obama 2012		Men/above or equal to 30/Obama 2012		Men/above or equal to 30/No Obama 2012	
		Mean	SDev	Mean	SDev	Mean	SDev	Mean	SDev	Mean	SDev	Mean	SDev	Mean	SDev	Mean	SDev
Outcomes	Citizen satisfaction	4.29	0.87	4.07	0.57	4.17	0.87	3.95	0.86	4.11	0.55	3.78	1.01	4.00	0.77	3.72	0.75
	Intention to use	3.94	2.11	2.90	1.67	4.50	1.84	3.27	1.85	4.00	2.22	3.03	2.10	4.24	2.13	3.13	2.14
	Overall usability	4.93	1.17	4.52	1.40	5.02	1.06	4.20	1.22	5.29	1.05	3.92	1.64	4.96	1.01	3.73	1.33
Usability dimensions	Home page	5.25	1.19	4.85	1.41	5.15	1.03	4.47	1.32	5.54	0.93	4.49	1.51	5.20	1.01	4.13	1.41
	Hardware and software	5.45	1.31	5.07	1.44	5.27	1.23	4.62	1.42	5.72	1.01	4.90	1.60	5.52	1.15	4.09	1.70
	Screen	5.17	1.23	4.74	1.48	5.10	1.13	4.51	1.28	5.47	1.03	4.38	1.73	5.23	0.97	4.18	1.40
	Scrolling	5.14	1.28	4.91	1.46	4.95	1.14	4.49	1.44	5.51	1.00	4.62	1.71	5.06	0.97	4.05	1.45
	User experience	5.18	1.20	4.78	1.33	4.97	1.06	4.37	1.24	5.42	0.96	4.38	1.55	5.19	1.07	3.90	1.35
n		83		51		45		42		51		32		47		23	

4. Problems and Recommendations: Six Illustrations

While a bulk of the attention has been directed at the infrastructure issues of healthcare.gov, there are substantial interface design issues with the website. Those who voted for Obama in 2012 appear to be more favorable, or perhaps more forgiving (e.g., citizens whose age is 30 or above and voted for Obama), in their evaluations. However, the evaluation in all groups is far from acceptable. Even in cases where citizens who favor a particular health policy may be more forgiving, designers need to use a representative sample of citizens in terms of their voting behavior in order to conduct testing so as to better understand interface problems. Based on the findings, we provide six illustrations of problems and potential fixes, drawn from usability.gov itself.

Overall, the findings suggest that with large scale e-government applications, such as health insurance, usability problems occur or even become more pronounced when designers do not consider (a) diversity of citizens in terms of educational backgrounds, voting behavior, and accessibility to reliable computing resources (e.g., hardware and software) and (b) complexity of enrolling in a health plan as the enrollment process involves creating an account and choosing an appropriate health plan. Literacy, including computer literacy, is likely to play a significant role in navigating through the website. For instance, although the website provides alternative means for helping citizens in the enrollment process (e.g., enrolling with a specialized agent), navigation and scrolling issues, as we explain later in this section, stood in the citizens' way to find help and support. As for the complexity of the enrollment process, even citizens who are literate, whether in terms of education or computing, still face difficulties. For instance, the health insurance context involves using complex terms that many of citizens are not aware of.

Hence, it was interesting to observe that citizens experienced a burden when attempting to access additional links and explanations of particular concepts in the health insurance domain.

4.1. Home page

Chapter 5 of the usability.gov guidelines (U.S. Department of Health and Human Services, 2006) suggests that the home page of a given e-government website should be well constructed and all information should be presented on a single screen. Figure 1 illustrates that users are required to scroll in order to access additional information that is embedded on the bottom of the home page (red oval was added to illustrate the problem). For citizens who need additional support (e.g., guidance through the enrollment process) due to low literacy in general or computer literacy in particular, it was difficult to observe additional content on the home page. *Recommendation:* Users should be able to view all the information on the home page without scrolling.

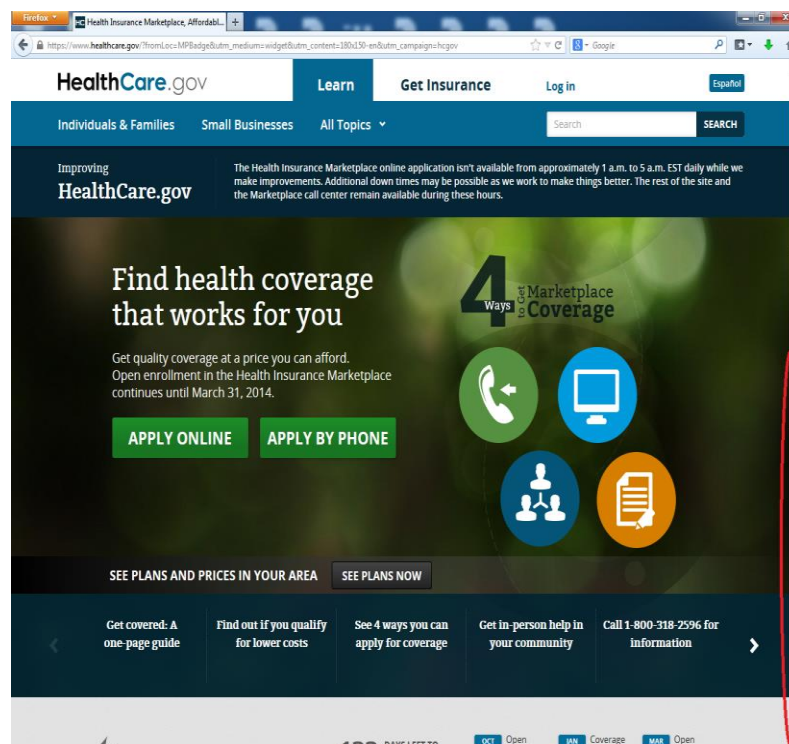


Fig. 1. Need to scroll on the home page

4.2. Hardware and software

According to chapter 4 of the usability.gov guidelines (U.S. Department of Health and Human Services, 2006), users should be able to view the content effectively independent of their screen resolution. Citizens, as opposed to clients in business organizations, are highly diverse in terms of access to computing resources. Hence, designers need to test their interface design with different screen resolutions or browsers. Figure 2 illustrates that an important drop down list was partially cut off (red arrow was added to illustrate the problem).

Recommendation: The design should accommodate all common screen resolutions.



Fig. 2. Improper display due to screen solutions

4.3. Screen

According to chapter 13 of the usability.gov guidelines (U.S. Department of Health and Human Services, 2006), users should not be required to activate the first data entry field when they access a given data entry form. Activating the first data entry field would be confusing for inexperienced users. Specifically, citizens with low computer literacy might find it difficult to predict their progress in the enrollment process and the need to enter data. Well-designed

websites, such as Google's Gmail, automatically activate the entry field and signal the user that data need to be entered by displaying a blinking cursor. Figure 3 illustrates that the data entry field in the account creation form is not activated and that the site does not signal to the user that data have to be entered (red arrow was added to illustrate the problem).

Recommendation: Place a blinking cursor at the beginning of the first data entry field.

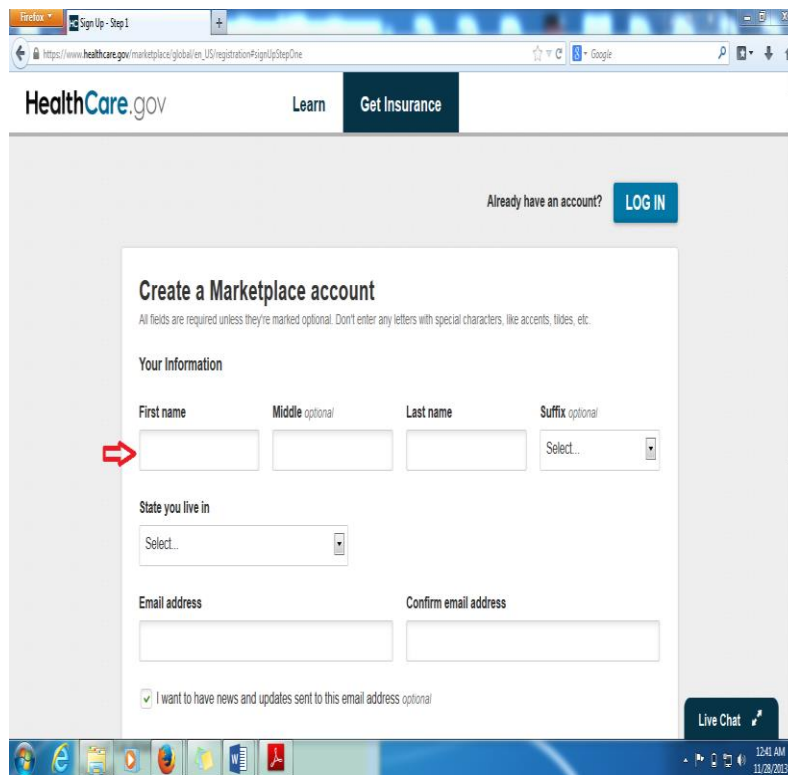


Fig. 3. Need to activate the first data entry field

4.4. Scrolling and paging

According to chapter 8 of the usability.gov guidelines (U.S. Department of Health and Human Services, 2006), users should be able to view the page without the need to scroll horizontally as such scrolling is slow and tedious for users. The website offered a nice Q&A feature to support citizens who are looking for clarifications about the enrollment process. However, Figure 4 illustrates that healthcare.gov users were required to scroll horizontally in

order to read the full question in the drop down list that is designed to support queries (red arrow was added to illustrate the problem).

Recommendation: Eliminate the need to scroll horizontally.

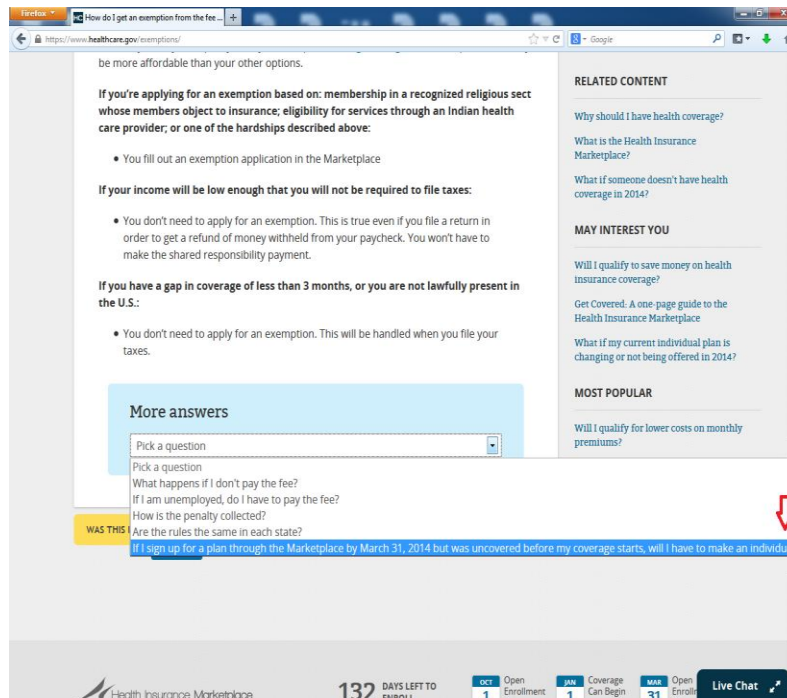


Fig. 4. Need to scroll horizontally to view content

4.5. User experience

According to chapter 2 of the usability.gov guidelines (U.S. Department of Health and Human Services, 2006), a given website should provide links to outside sources and materials in case users need more information. For health insurance in particular, even citizens who are literate need to be able to quickly locate more information about complex health insurance terms. Figures 5 and 6 illustrate that healthcare.gov neither highlights nor activates URL links in order to improve user experience (red ovals were added to illustrate the problem). Inactive links introduce an additional burden on users because they are required to manually copy-and-paste the link to their web browsers to access the content of that link.

Recommendation: Provide activated links to sources and materials.

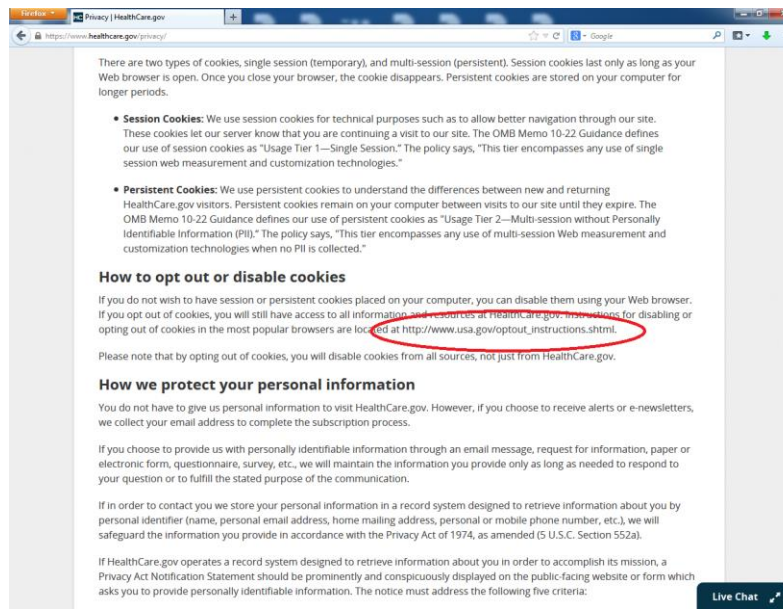


Fig. 5. Need to activate links manually (illustration 1)

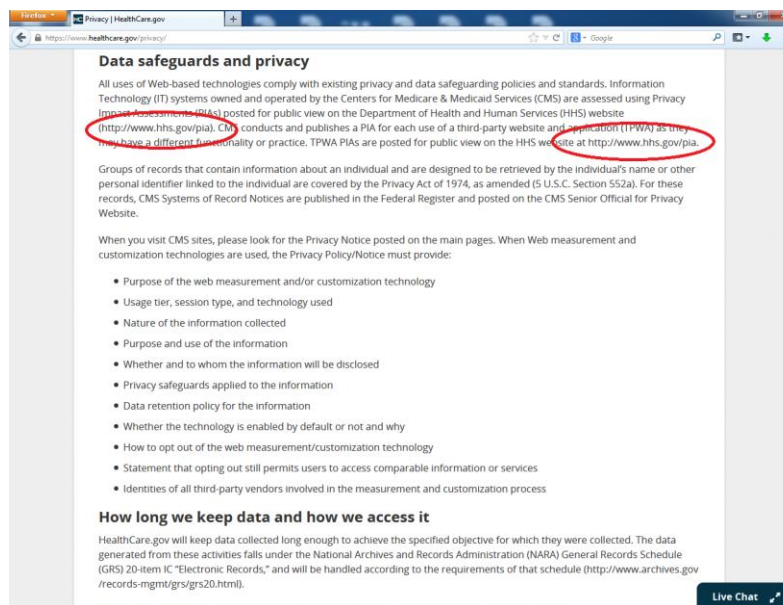


Fig. 6. Need to activate links manually (illustration 2)

4.6. Overall usability

The W3C usability measures (W3C, 2013) emphasize that users find it helpful to have access to a progress bar and that these progress bars should be easily interpretable. Figure 7 shows that a progress mechanism is displayed on the left bottom of the page (red oval was added to illustrate the problem). The circles' colors change from grey to black as the user progresses.

The main issue with such a mechanism is that some users might find it difficult to differentiate between the two colors, especially when there are many steps, because the two colors are close in terms of darkness. Further, the progress mechanism might be more familiar to citizens who use particular platforms, such as MAC OS, which in turn discriminates against citizens who do not use a particular platform. Thus, it might be better to use different colors that are easily differentiated or use numbers instead.

Recommendation: Use progress mechanisms that are easy to understand.

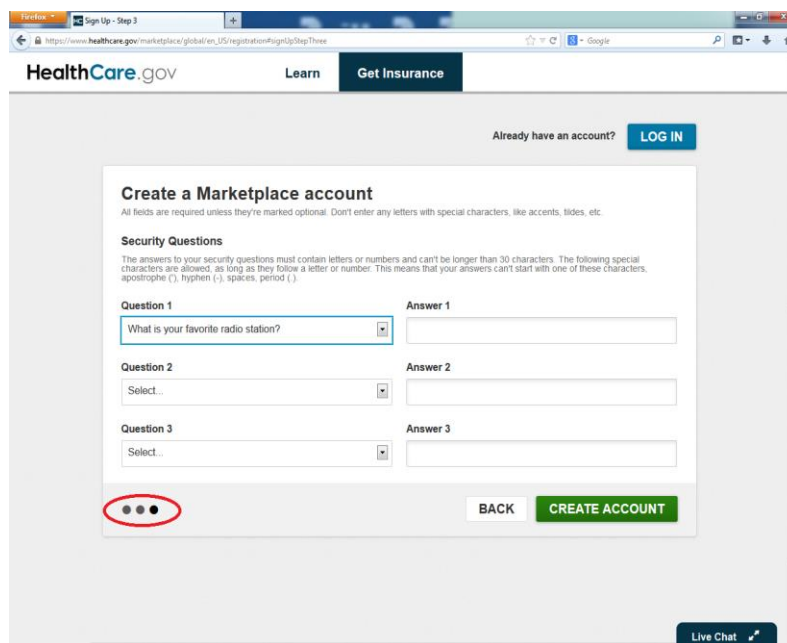


Fig. 7. Difficulty in interpreting progress mechanisms

A related usability issue is the degree to which the website is perceived to be unnecessarily complex. Enrollment in a health insurance plan is essentially a complex process even for citizens with high literacy in general or computer literacy in particular. Hence, websites need to display helpful information to facilitate users' tasks, here applying/shopping for a health insurance plan. Figure 8 shows that a pop up window displays more information about a concept (red arrows were added to illustrate the problem). The window is cluttered with small text size,

which might be difficult for some users to read. Such a design makes it more complex for users to find relevant information and use it effectively in their tasks.

Recommendation: Display helpful information in a usable and easy to understand form.

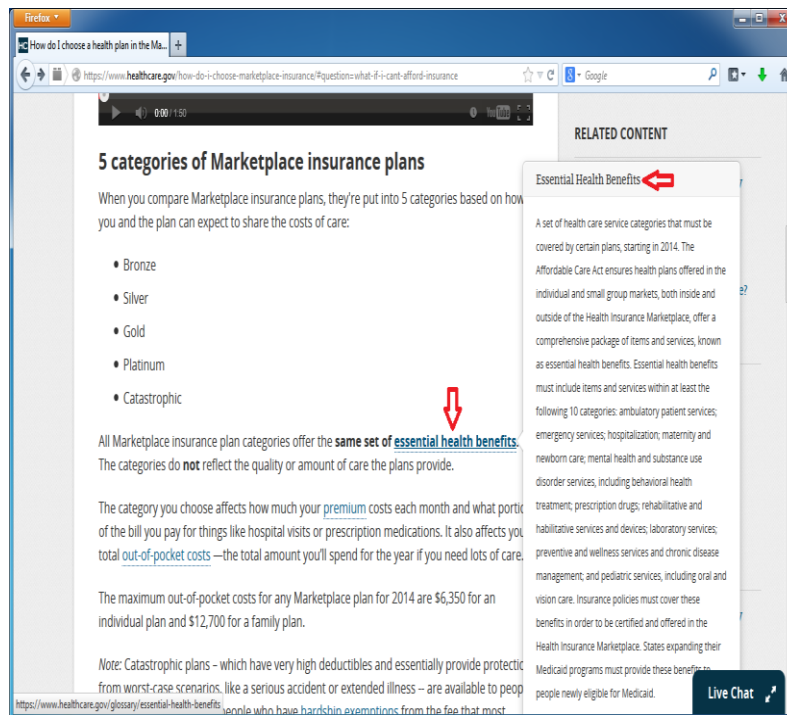


Fig. 8. Difficulty in processing information

5. Conclusion

Interface design issues with the Obamacare website render the website to be less than usable. By a miracle, even if the infrastructure issues were resolved, even Obama backers are likely to continue to find the site to be wanting. Considering that the goal of the website is to reach citizens who are likely to be less computer literate, the usability issues are likely to hinder their use of the website. The illustrative problems noted in this paper and potential solutions, simple as they are, will be vital in making the Obamacare website achieve its potential. It is necessary to go beyond these illustrative problems and solutions to a comprehensive overhaul based on good usability practices. From a practical perspective, the illustrative problems and

solutions might provide quick guidance to software development endeavors, especially those utilizing agile methods (Kude et al. 2014) in the context of e-government applications. Further, policy makers might need to consider making it mandatory to adhere to formal usability guidelines, but at the same time, allow some level of flexibility to accommodate changes in technology and users' needs.

Future research might proceed to leverage analytics to predict usability of similar large-scale e-government applications based on individual health conditions and demographics. Future research may also compare the usability of healthcare.gov as well as other large-scale e-government applications across wireless and web sites. A significant body of work has accumulated around technology adoption and future work could relate the usability of this and other healthcare web and wireless sites to theories related to technology adoption (see Venkatesh 2000; Venkatesh and Davis 2000; Venkatesh et al. 2016). Finally, with the increased penetration of smart phones, future research should focus on developing instruments for assessing mobile application usability in the context of large scale e-government applications.

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