A Usability Evaluation of the Economic Census Web Site

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September 18, 2008

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Abstract

In August 2008, the U.S. Census Bureau Statistical Research Division (SRD) conducted usability testing to evaluate the newly designed Economic Census (Econ) Web site. The testing evaluated the success and satisfaction of seven externally recruited participants with the Web site. Usability testing revealed several usability problems, including lack of visibility for the top navigation bar, non-informative information on the main page and multiple confusing ways to retrieve data. Recommendations were provided to the Econ team. This report provides a complete summary of the findings of this usability evaluation. Recommendations are provided to improve the usability of and satisfaction with the Economic Census Web site.

Executive Summary

In August 2008, the U.S. Census Bureau Statistical Research Division (SRD) conducted usability testing to evaluate the newly designed Economic Census Web site. The testing evaluated the success and satisfaction of externally recruited participants with the Web site. Testing took place at the U.S. Census Bureau Usability Laboratory in Suitland, MD.

<u>Purpose.</u> The primary purpose of the usability testing was to identify elements of the user interface design that were problematic and lead to less effective, less efficient and less satisfying experiences for people using the Web site.

<u>Method.</u> Seven participants were recruited externally through a database maintained by the Usability Lab. Participants were knowledgeable in navigating the Internet and using a computer, and all were unfamiliar with the Economic Census Web site. Each participant sat in a small room, facing one-way glass and a wall camera, in front of an LCD monitor equipped with an eye-tracking machine. The test participant and test administrator were not in the same room. The sessions were audio and video recorded, and tracking of the participants' eye movements were recorded during the usability tests.

While completing the ten tasks, participants were encouraged to think aloud and to share what they were thinking about the tasks. If at any time the participant became quiet, the test administrator reminded the participant to think aloud. The participant's narrative allowed the test administrator to gain a greater understanding of how they completed the tasks and to identify issues with the Web site. The test administrator noted any behaviors that indicated confusion.

After completing all tasks, the participants completed a Satisfaction Questionnaire then answered debriefing questions. Overall, each usability session ran about 60 minutes.

<u>Results.</u> The full report provides complete descriptions of each finding and recommendations for usability issues. The following section highlights issues and recommendations to resolve them.

1. Most participants, most of the time, missed the top navigation bar altogether. This led to a longer, less efficient route of finding information. **Recommendation:** Adjust colors in top navigation to have greater contrast. Make the navigation bar wider and include a white bar in between the header and top navigation. Make the lines in between the links more pronounced, perhaps in a different color. From the start, highlight Main on the top navigation.

2. The information on the main page is not informative enough to guide the user in an efficient manner. **Recommendation:** Organize information on the Main page according to novice users. Have a tutorial for first time users that details how to get data and information. Add a definitions link to common terms. Add a Search function, specific to the Economic Census Web site. Introduce another "layer" above the present structure that is less detailed and more over-arching.

3. There are multiple ways to get data that are confusing. **Recommendation:** Combine the "Using American FactFinder," "Get Data," and "Getting Data" links into one link.

4. There is hardly any information on the Methodology page that discusses the Methodology. **Recommendation:** Add more details about how 2007 Economic Census data was collected and processed.

5. The Contacts by Industry do not seem organized in a systematic way. **Recommendation:** Alphabetize the list of contacts.

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1.0 Introduction

In preparation for the launch of the new Economic Census Web site, the Census Bureau Statistical Research Division (SRD) conducted usability testing to evaluate the newly designed site. The testing evaluated the success and satisfaction of the test participants with the Web site developed by the Economic Census team in the Economic Planning and Coordination Division (EPCD). Participants attempted to complete tasks supported by the Web site but developed specifically for the usability test. The findings and recommendations found in this study are designed to inform the designer on areas of satisfaction as well as areas where the participants struggled using the Economic Census Web site.

1.1 Background

The user interface is an important element to the design of a Web site. For a Web site to be successful, the user interface must be able to meet the needs of its user in an efficient, effective, and satisfying way. The present study was designed to examine the user interface of the Economic Census Web site, which is scheduled to be launched on October 31, 2008. Users of the Web site must be able to successfully navigate throughout the interface to find the appropriate information in an efficient and effective manner.

Two expert reviews were conducted prior to this usability test plan. One was conducted in February 2008 (Morgan, Beck, Trofimovsky & Murphy, 2008) and the other in July 2008 (Romano & Murphy, 2008). Changes to the Web site were made based on recommendations from both expert reviews.

1.2 Purpose

The primary purpose of the usability testing is to identify elements of the user interface design that are problematic and lead to less effective, efficient and satisfying experiences for people using the Web site.

1.3 Usability Goals

The usability goals for this study were defined in three categories: user accuracy, efficiency, and satisfaction. In this plan, these goals reflect the extent to which the user-interface was expected to support user performance and satisfaction.

Goal 1: To achieve a high level of accuracy in completing the given tasks using the Economic Census Web site. The user should be able to successfully complete 75 percent of the given tasks.

Goal 2: To achieve a high level of efficiency in using the Economic Census Web site. The user should be able to complete the tasks in an efficient manner taking four minutes or less to complete each task. In addition, the user should look at the AOIs five minutes or less into the study.

Goal 3: To experience a moderate to high level of satisfaction from experience using the Economic Census Web site. The overall mean of the Satisfaction Questionnaire ratings should be well above the mean (5 or above on a nine-point scale, where 1 is the lowest rating and 9 is the highest rating). The same should be true for the individual Satisfaction Questionnaire items.

1.4 Scope

All user interactions with the Economic Census Web site are within the scope of the usability evaluation. The user interface design was not tested for compliance with the Section 508 regulations at

this time. However, since this is a government Web site, before the Web site becomes available for use, it must comply with Section 508 regulations unless a waiver has been granted.

1.5 Assumptions

- Participants were external, non-federal employees who were recruited via the SRD Usability Lab database.
- Participants had at least one year of prior Internet and computer experience.
- Participants had prior knowledge of how to navigate a Web site.
- Participants did not have extensive prior experience using the Economic Census Web site.

2.0 Method

2.1 Participants and Observers

Eight participants were recruited externally through a database maintained by the Usability Lab. One participant was removed from the analysis due to inexperience navigating through the Internet observed during the usability testing. The remaining participants were considered knowledgeable in navigating the Internet and using a computer. All were unfamiliar with the Economic Census Web site. Prior to beginning the tasks, the participants were briefly informed about the purpose of the study and the uses of data that are collected during the study. Observers from the Econ team were invited to watch the usability tests on television screens in a separate room from the participant and test administrator. At the end of each test session, the test administrator and observers had the opportunity to discuss the findings from that session and compare them to findings from other sessions. See Table 1 for participant demographics.

Table 1.

Participant mean (and range) characteristics.	
Gender	3M / 4F
Age (in years)	38.43 (23-59)
Education (in years)	17.71 (14-21)
Comfort learning a new Web site*	4.14 (2-5)
Comfort navigating through the Internet*	4.43 (3-5)
Overall experience with computers**	6.57 (3-8)
Overall experience with the Internet**	6.86 (4-8)

  * Scale 1-5. ** Scale 1-9.

2.2 Facilities and Equipment

Testing took place at the Usability Lab at the U.S. Census Bureau in Suitland, MD, Room 5K509.

2.2.1 Testing Facilities

The participant sat in a small room, facing one-way glass and a wall camera, in front of an LCD monitor equipped with an eye-tracking machine that was on a table at standard desktop height. The test participant and test administrator were not in the same room. During the usability test, the test administrator was in the control room on the other side of the one-way glass. The test administrator and the test participant were able to communicate via microphones and speakers.

2.2.2 Computing Environment

The participant's workstation consisted of a Dell OptiPlex GX150 personal computer with a Pentium IV processor and 512 MB of RAM, a Tobii LCD monitor equipped with cameras for eye tracking, a standard 101/102 key quiet keyboard, and a PS2 IntelliMouse with a wheel. The operating system was Windows XP.

2.2.3 Audio and Video Recording

Video of the application on the test participant's monitor was fed through a PC Video Hyperconverter Gold Scan Converter, mixed in a picture-in-picture format with the camera video, and recorded via a Sony DSR-20 digital Videocassette Recorder on 124-minute, Sony PDV metal-evaporated digital videocassette tape. Audio for the videotape was picked-up from one desk and one ceiling microphone near the test participant. The audio sources were mixed in a Shure audio system, eliminating feedback, and fed to the videocassette recorder.

2.2.4 Eye-Tracking

Tracking of the participant's eye movements was recorded during the usability test. Using the ClearView 2.0 software program, the Tobii eye-tracking device monitored the participant's eye movements and recorded eye gaze data. This type of eye tracking required the calibration of each eye. Data collected from the eye tracking device included eye gaze position, timing for each data point, eye position, and areas of interest. Areas of interest (AOIs) were defined prior to the usability evaluation as areas that are of particular interest to the evaluator. For this study, in collaboration with the sponsor, we identified the following AOIs: (1) top orange navigation bar, (2) left navigation, and (3) main AFF link: Get Economic Census Data. See Appendix A.

2.3 Materials

2.3.1 General Introduction

The test administrator read some background material and explained several key points about the session. See Appendix B.

2.3.2 Consent Form

Prior to beginning the usability test, the participant completed a consent form. See Appendix C.

2.3.3 Questionnaire on Computer Use and Internet Experience

Prior to the usability test, the test participant completed a questionnaire on his or her computer use and Internet experience. See Appendix D.

2.3.4 Tasks and Task-based Goals

Members of the Economic Census team, as well as members of the Census Bureau's Usability Lab, created the tasks and the task-based goals. The tasks were designed to capture the participant's interaction with and reactions to the design and functionality of the Economic Census Web site. See Appendix E.

2.3.5 Satisfaction Questionnaire

Members of the Usability Lab created the Satisfaction Questionnaire, loosely based on the Questionnaire for User Interaction Satisfaction (QUIS, Chin, Diehl, and Norman, 1988). In usability tests at the Census Bureau, typically 10 to 12 items are used that are tailored to the particular user

interface being evaluated. In this study, the Satisfaction Questionnaire included 10 items worded for the Economic Census Web site. See Appendix F.

2.3.6 Debriefing Questions

After completing all tasks, the participant answered debriefing questions about his/her experience using the Econ Web site. See Appendix G.

2.3.7 Payment Voucher

Upon completion, the participant signed and dated a payment voucher. See Appendix H.

2.4 Procedure

Each test participant separately reported to the usability lab at the U.S. Census Bureau. Upon arriving, the test participant was seated in the testing room. The test administrator greeted the participant and read the general introduction. Next, the participant read and signed the consent form. After signing the consent form, the test participant completed the Questionnaire on Computer Use and Internet Experience. During this time, the test administrator left the task questions and Satisfaction Questionnaire on the desk beside the participant and left the testing room to do a sound check in the control room. Upon completion of the questionnaire, video recording began, and the participant's eyes were calibrated. Calibration consisted of the participant looking at a dot moving around the computer screen and took approximately fifteen to twenty seconds. Once calibration was complete, the eye tracker began recording data.

Following calibration, the participant completed the Economic Census Web site tasks. At the start of each task, the participant read the task aloud. While completing the tasks, the participants were encouraged to think aloud and to share what they were thinking about the tasks. If at any time the participant became quiet, the test administrator reminded the participant to think aloud. The participant's narrative allowed the test administrator to gain a greater understanding of how they completed the tasks and to identify issues with the Web site. At the conclusion of each task, the participant stated their answer to the task aloud. During the task, the test administrator noted any behaviors that indicated confusion, such as hesitation, backtracking and frowning. After completing all tasks, the eye tracking device was stopped, and the participant completed the Satisfaction Questionnaire.

After the participant completed the Satisfaction Questionnaire, the test administrator returned to the testing room where the test participant answered the debriefing questions. This was an opportunity for a conversational back and forth exchange where the test administrator remained neutral. At the conclusion of the debriefing, the video recording was stopped. Overall, each usability session ran about 60 minutes.

2.5 Performance Measurement Methods

2.5.1 Accuracy

After each participant completed a task, the task was rated as a success or a failure. In the context of usability testing, successful completion of a task means that the design supported the user in reaching a goal. Failure means that the design did not support task completion. A successful task involved the test participant successfully navigating the user interface to identify the correct piece of information on the Web site based on the task objective. If the participant struggled to find the information, but eventually arrived at the correct response, this was marked as a success. A failure was recorded when

the user interface presented obstacles to the participant's attempts to identify the correct piece of information.

The average accuracy score is divided into two different means: (1) accuracy across the participants and (2) accuracy across the tasks. Prior to the usability study, the sponsor and the Usability Lab set an overall accuracy goal of 75 percent across the participants.

2.5.2 Efficiency

After all usability tests were complete, an average time taken to complete each task was calculated. In addition, time to look at the AOIs was calculated. An average across all participants was calculated for each of the three AOIs.

2.5.3 Satisfaction

After completing the usability session, each participant indicated his/her satisfaction with the Web site using the tailored ten-item Satisfaction Survey. For example, participants were asked to rate their overall reaction to the site by circling a number from 1 to 9, with 1 being the lowest possible rating and 9 the highest possible rating. From the Satisfaction Survey data, we report ranges and mean scales values for the various rated attributes of the Web site. We also identify below-mean values, which indicate that problems exist even when the overall mean is acceptable or better.

2.5.4 Eye Tracking

Eye tracking captures exactly where people look as they navigate through a Web site. We can look at an individual's pathway through a site as well as accumulate data and show the common pathways through a Web site. Eye tracking measures include fixations, gazes, scanpaths and hotspots. A fixation is an instant where the eyes are relatively still. Fixations last 218 milliseconds, on average (Poole & Ball, 2005). Although the meaning of differing lengths of fixations is a matter of discussion among experts, there is some evidence for the following interpretations (Poole & Ball, 2005). During an encoding task, such as looking at a Web page, higher fixations indicate an area of interest and/or that the target may be complex and difficult to understand. During a search task, higher fixations indicate greater uncertainty in identifying the target object and/or the length of fixation indicates processing time. For the purposes of this usability test, the tasks fall into both the encoding and search categories. The analysis of high number of fixations will be specific to the given task.

A gaze is the total number of fixations in a given area across all subjects. Gazes indicate which areas are getting the most attention (Poole & Ball, 2005). We were able to see the exact gazes of the individual participants, as well as a mean across all participants. Here, we identify gazes for predetermined AOIs.

A scanpath shows the search – fixate – search sequence. In a task involving searching, a straight scan path is optimal with short fixation time at the target; a longer-lasting scanpath demonstrates less effective searching, and a long-length scan path is an indication of inefficient searching (Poole & Ball, 2005).

A hot spot is an area of the screen where people spend a few moments looking. Hot spots can be examined individually or can be collapsed across participants for a mean image that displays the average of all hot spots for all the participants together. Hot spots taken together form a heat map with a range in color from green (short amount of time fixating) to red (long amount of time fixating). Here, we examine predefined AOIs and determine whether or not these areas are hot spots.

2.5.5 Identifying and Prioritizing Usability Problems

To identify design elements that caused participants to have problems completing the task objectives, the test administrator recorded detailed notes during the usability session. To reinforce notes recorded during the usability session, the test administrator used the videotape recordings to refresh memory and to confirm findings. By noting participant behavior and comments, the test administrator in cooperation with additional usability staff members, inferred the likely design element that caused the participant to experience difficulties. The usability issues were grouped into categories based on priority. The findings and recommendations of these issues are presented below.

The usability team assigned each problem a priority code, based on its effect on performance, as follows:

- *High Priority* – These problems bring the test participant to a standstill. He or she is not able to complete the task.
- *Medium Priority* – These problems cause some difficulty or confusion, but the test participant is able to complete the task.
- *Low Priority* – These problems cause minor annoyances but do not interfere with the flow of the tasks.

3.0 Results and Recommendations Based on Usability Testing

Results from the usability testing are discussed below. The quantitative data, usability findings, and eye-tracking data are presented. See Appendix I for raw behavioral data and eye tracking data.

3.1 Participant Accuracy

The overall accuracy score was 56 percent. Accuracy scores ranged from 30 percent to 90 percent across users and from zero to 86 percent across tasks. Although some questions included wording that provided hints to users, the accuracy scores were still not in line with the 75 percent accuracy goal. It appears that participants struggled the most with tasks # 7, #8 and #9. For task #7, no participants completed the task accurately. For task #8, one participant completed the task successfully, and for task #9, three participants completed the task successfully. See Table 2 for user accuracy scores, Appendix E for the complete tasks and Appendix I for raw behavioral data.

Table 2.

											Overall Success
User Accuracy Scores for Usability Testing of the Economic Census Web Site.											
					Task						**Success**
Participant	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Rate**
1	Success	**Failure**	Success	**Failure**	Success	Success	**Failure**	**Failure**	Success	Success	**60%**
2	**Failure**	Success	Success	Success	Success	Success	**Failure**	**Failure**	**Failure**	**Failure**	**50%**
3	**Failure**	Success	**Failure**	Success	Success	Success	**Failure**	**Failure**	**Failure**	Success	**50%**
4	Success	**Failure**	**Failure**	Success	**Failure**	**Failure**	**Failure**	**Failure**	**Failure**	Success	**30%**
5	Success	Success	Success	Success	Success	Success	**Failure**	Success	Success	Success	**90%**
6	**Failure**	Success	Success	**Failure**	Success	**Failure**	**Failure**	**Failure**	**Failure**	**Failure**	**30%**
7	Success	Success	Success	Success	Success	Success	**Failure**	**Failure**	Success	Success	**80%**
Success by Task	**57%**	**71%**	**71%**	**71%**	**86%**	**71%**	**0**	**14%**	**43%**	**71%**	**56%**

As can be seen in the raw data in Appendix B, there was no clear trend in performance for tasks #7, #8 and #9. This suggests that there is no clear path that participants followed to get to the desired information. Participants clicked back and forth and searched around the site rather than finding an obvious route to the desired information. In fact, tasks #7 and #8 had the highest amount of back button hits (21 and 40, respectively) and task #10 had the highest number of attempts (three participants; 43 percent) at using Search [which does not exist- the Search on this Web site is specific to North American Industry Classification System (NAICS) codes].

3.2 Participant Efficiency

The average time to complete each task was 2.63 minutes, which is within the set goal of 4 minutes or less. The users were able to complete the tasks in an efficient manner. However, only 39 responses (56 percent) were correct and included in this calculation. See Table 3 for detailed times to complete each task and Appendix E for a complete list of the tasks.

Table 3.

					Time in Minutes to Complete Each Task.						
					Task						**Mean Time by**
Participant	1	2	3	4	5	6	7	8	9	10	**Participant**
1	3	4*	1	3*	2	5	1*	5*	4	3	**3.00**
2	1*	2	1	7	1	1	3	7*	5*	2*	**2.50**
3	1*	4	2*	5	1	1	1*	7*	6*	1	**2.40**
4	2	5*	3*	2	2*	2*	7*	7*	1*	1	**1.67**
5	1	2	3	2	1	1	7*	4	2	3	**2.11**
6	6*	4	1	6*	5	5*	7*	5*	4*	6*	**3.33**
7	4	3	4	5	1	5	6*	6*	3	1	**3.25**
Mean Time by Question (correct responses only)	**2.25**	**5.00**	**2.00**	**4.20**	**1.83**	**2.60**	**3.00**	**4.00**	**3.00**	**1.80**	**2.63**

* Task Failure: time not included in mean calculation.

Table 4 reports the time that elapsed before looking at each AOI. For the top navigation, four participants looked at the area in the first task, one looked at it in the second task, one in the third task and one in the sixth task. The average time elapsed before participants looked at the top navigation was 6 minutes 39 seconds.

For the left navigation, four participants looked in that area in the first task, one looked at it in the second task, one in the fourth task and one in the seventh task. The average time elapsed before participants looked at the left navigation was 6 minutes 1 second.

For the main AFF link, four participants looked in that area in the first task, one looked at it in the second task, one in the fourth task and one in the sixth task. The average time elapsed before participants looked at the main AFF link was 5 minutes 25 seconds. Each of these results was not within the set goal of looking at the AOI within five minutes from the start of the study.

Table 4.

Time in Minutes (m) and Seconds (s) Elapsed Before Participants First Looked at AOI.			
	AOIs		
Participant	**Top navigation**	**Left navigation**	**Main AFF link**
1	3s, task #1	9m43s, **in task #4**	7s, task #1
2	6m19s, task #1	19s, task #1	3s, task #1
3	5m15s, **in task #3**	3s, task #1	56s, task #1
4	29s, task #1	21s, task #1	2s, task #1
5	43s, task #1	13s, task #1	6m43s, **in task #4**
6	25m21s, **in task #6**	6m25s, **in task #2**	22m2s, **in task #6**
7	7m34s, **in task #2**	22m14s, **in task #7**	4m3s, **in task #2**
Mean time to first look at AOI	**6m39s**	**6m1s**	**5m25s**

3.3 Participant Satisfaction

The average satisfaction score was 5.93, which is above the mean, but not *well* above, which was the goal set for the Web site. Although the means were quite high for satisfaction by question, some individual participant mean ratings were quite low. Ratings below the mid-point of the scale indicate issues that may affect other users. It is well known that users tend to give higher satisfaction ratings than might be expected from their accuracy scores (Andre & Wickins, 1995; Beck & Murphy, 2008; Malakhoff, 2007). Thus, it is not surprising that the satisfaction scores are closer to the set goal than the accuracy scores are. See Table 4 for detailed user satisfaction results and Appendix F for a complete list of satisfaction questions.

Table 5.

User Satisfaction Results for the Economic Census Web Site (1 = low, 9 = high).											
	Satisfaction Survey Items										**Mean Satisfaction Rating by**
Participant	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Participant**
1	3	4	3	5	6	2	3	6	3	3	**3.8**
2	6	7	8	8	7	7	7	8	7	8	**7.3**
3	6	5	6	6	4	4	5	7	5	6	**5.4**
4	6	6	7	5	5	5	4	7	6	4	**5.5**
5	8	7	8	8	8	8	8	8	8	8	**7.9**
6	2	3	2	7	6	2	3	2	5	2	**3.7**
7	7	8	9	8	8	7	8	9	8	8	**8.0**
Mean Satisfaction Rating by Question	**5.43**	**5.71**	**6.14**	**6.71**	**6.29**	**5.00**	**5.43**	**6.71**	**6.00**	**5.57**	**5.93**

3.4 Eye Tracking Findings

3.4.1 Gazes

A gaze is the total number of fixations in a given area across all tasks. Tables 6, 7, and 8 show the gazes for each of the three AOIs. Participants looked at the left navigation the most, followed by the top navigation, and then the main AFF link. The top navigation was looked at 293 total times across all participants across all tasks, with a range of five to 49 across tasks and a range of one to 97 across participants. The left navigation was looked at 742 total times across all participants across all tasks,

with a range of zero to 236 across tasks and a range of four to 337 across participants. The main AFF link was looked at 134 total times across all participants across all tasks, with a range of one to 54 across tasks and a range of four to 54 across participants. These results demonstrate that participants do not always look at the important AOIs and often miss the main AFF link altogether. Furthermore, there are inconsistencies across participants demonstrating that participants have different ways of approaching the Web site.

Table 6.

| | Gazes in AOI: Top Navigation Bar. | | | | | | | | | | |
| | Task | | | | | | | | | | Total Gaze by |
Participant	1	2	3	4	5	6	7	8	9	10	Participant
1	1	0	*	0	*	1	0	0	2	0	**4**
2	5	1	0	20	0	0	19	2	22	7	**76**
3	0	1	2	3	1	0	1	3	0	1	**12**
4	4	13	2	8	2	4	14	14	*	31	**92**
5	19	21	1	7	0	3	3	17	16	10	**97**
6	0	0	0	0	0	1	0	0	0	*	**1**
7	0	1	*	0	4	0	0	3	3	0	**11**
Total Gaze by Question	**29**	**37**	**5**	**38**	**7**	**9**	**37**	**39**	**43**	**49**	**293**

*No eye tracking data.

Table 7.

| | Gazes in AOI: Left Navigation. | | | | | | | | | | |
| | Task | | | | | | | | | | Total Gaze by |
Participant	1	2	3	4	5	6	7	8	9	10	Participant
1	0	0	*	0	*	0	0	2	0	2	**4**
2	2	13	0	64	0	2	17	42	23	18	**181**
3	0	0	0	12	0	0	0	8	46	20	**86**
4	0	3	0	6	0	13	10	55	*	32	**119**
5	2	7	34	43	0	24	61	123	10	33	**337**
6	0	1	0	0	0	0	6	2	2	*	**11**
7	0	0	*	0	0	0	0	4	0	0	**4**
Total Gaze by Question	**4**	**24**	**34**	**125**	**0**	**39**	**94**	**236**	**81**	**105**	**742**

*No eye tracking data.

Table 8.

| | Gazes in AOI: Main AFF Link. | | | | | | | | | | |
| | Task | | | | | | | | | | Total Gaze by |
Participant	1	2	3	4	5	6	7	8	9	10	Participant
1	0	0	*	0	*	32	0	0	0	0	**32**
2	2	0	1	9	1	10	1	4	10	18	**54**
3	0	1	0	0	0	0	0	0	3	0	**4**
4	1	2	0	2	1	2	5	4	*	1	**18**
5	0	0	0	0	1	7	0	2	0	0	**10**
6	0	0	0	0	0	2	6	0	0	*	**8**
7	0	1	*	0	2	1	0	4	0	0	**8**
Total Gaze by Question	**3**	**4**	**1**	**11**	**3**	**54**	**12**	**14**	**13**	**19**	**134**

*No eye tracking data.

3.4.2 Hot Spots

The hot spot data indicates areas where participants spent some time looking. Figure 1 shows the heat map for all participants across all tasks. The reds and the oranges indicate longer fixation times, while the green indicates shorter fixation times. As can be seen, no important piece of information on the Main page of the Web site was overlooked.
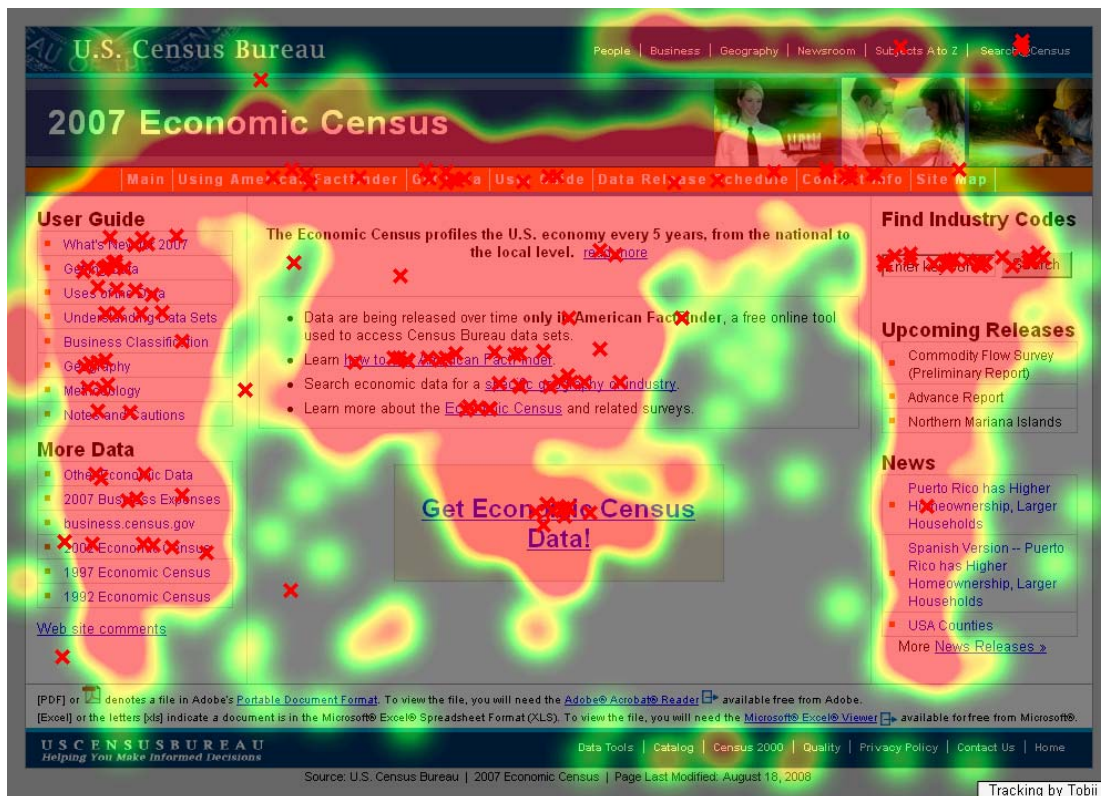

Figure 1. Heat Map for All Participants Across All Tasks.

3.5 Positive Findings

1. Most participants commented that the layout of the Web site was clear. Participants liked the consistency of the top navigation and the left navigation.
2. Six out of seven participants responded positively to the color scheme, noting that the colors were good and "easy on the eyes."
3. Most participants commented that the Economic Census Web site had a good layout. Some commented that even when things were not obvious, it was easy to back up and try again.
4. Participants were quickly able to locate the Contact Information.
5. Six out of seven participants were quickly able to figure out how to sort rows on a data set.

3.6 Usability Problems

Reasons for the performance deficits are discussed in the list of usability violations that follows. The usability problems are prioritized from high to low in terms of their effect on participant performance. The usability issues deal primarily with difficulty in locating certain pieces of information within the Web site. Fixing the high and medium priority problems as they occur throughout the Web site should result in improvement in the participants' performance using the Web site and improved satisfaction.

Appendix I contains the raw data collected from the usability test from which we derived the findings and recommendations.

3.6.1 High Priority Issues

Testing identified two high priority usability issues. These issues caused participants to struggle to the point that they were unable to recover and complete the task successfully.

3.6.1.1 Top Navigation Bar

Most of the time most participants missed the top navigation bar altogether. Once they scrolled over and noticed the change in color, they then were able to use the navigation buttons. This led to a longer, less efficient route of finding information. For example, task #4 requires the user to click on the "Data Release Schedule" link in the top navigation bar. Of the five participants who successfully completed the task, only one was able to do so immediately. Four of the five were able to complete the task, but only after many attempts and searches all over the Web site. As can be seen in the eye tracking data in Appendix I, four out of six participants[1] did not look at the top navigation for task #4. In fact, the mean time across participants to look at the top navigation was six minutes and 39 seconds (range 3 seconds – 25 minutes and 21 seconds). See Section 3.4.1 of this report for detailed data of when participants first looked at the top navigation.

   Recommendation: Adjust colors in top navigation to have greater contrast. Figures 2, 3 and 4 display contrasting colors in the top navigation. Make the navigation bar wider and include a white bar in between the header and top navigation. As it is now, the top navigation looks like it is part of the header; white space would separate the two. See Figures 2 and 3 for examples of white space between the header and top navigation. Make the lines in between the links more pronounced, perhaps in a different color. Figures 2, 3, and 4 display pronounced lines in between the links. From the start, highlight Main on the top navigation. This will bring attention to the top navigation bar and inform users that they are currently on the Main page. See Figure 3 for an example.

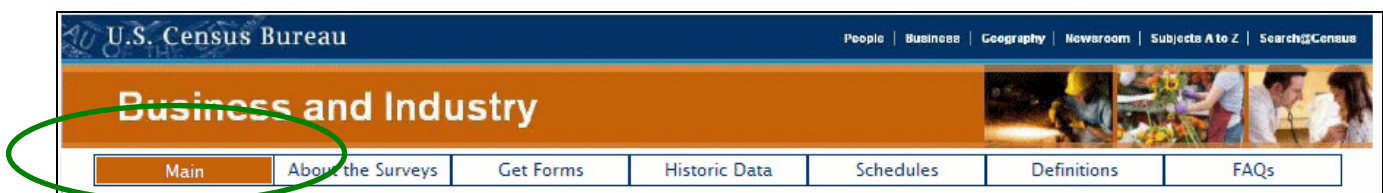**Figure 2. Example of White Lines Between Links and White Space Between Header and Top Navigation.**

Figure 3. Example of Main Link Highlighted in Top Navigation.

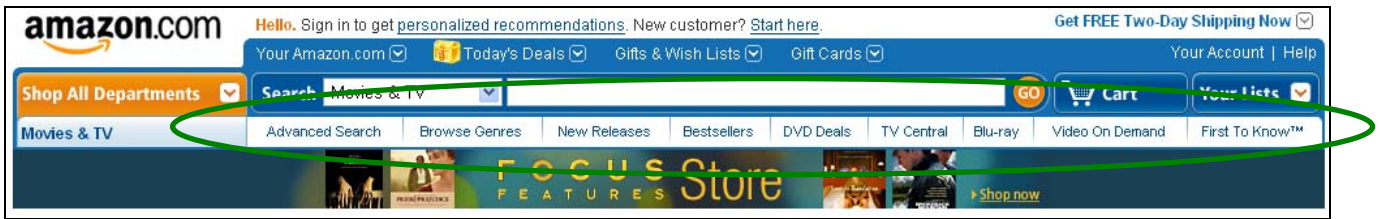1 Eye tracking data were not recorded for one participant for this task.

Figure 4. Example of Words in Top Navigation in a Contrast Color.

3.6.1.2 Information on the Main Page

The information on the main page is not informative enough to guide the user in an efficient manner. Oftentimes, users are able to complete tasks, but only after searching the Web site and using the back button frequently. As can be seen in the raw data in Appendix I, participants used the back button frequently for many of the tasks, and many participants attempted to use the Search function on more than one occasion.   Four out of seven participants looked for a glossary of terms. Jumping around the Web site was frustrating for many participants as users generally want to get information in the fewest possible steps (Lynch & Horton, 2001, p. 22) Furthermore, in debriefing, many participants stated that they felt that it was easy to find information, but only after they were on the right track and had searched around.

>   **Recommendation:** Organize information on the Main page according to novice users. Perhaps have a tutorial for first time users that details how to get data and information. Add a definitions link to common terms. Add a Search function, specific to the Economic Census Web site. Figure 4 displays a Search bar that is specific to the site. It is located in the upper right corner, where users expect to find it, and it is clearly marked so that users know that they are searching the site and not the NAICS codes. Introduce another "layer" above the present structure that is less detailed and more over-arching. When the user clicks on options, go into specific details. For example, begin with the Main page, then a Pathway page, followed by the Information page (Redish, 2007, p.114). Users typically read only a few words of a page before deciding if it has what they are looking for (Redish, 2007, p.102), so keep the information clear and concise.
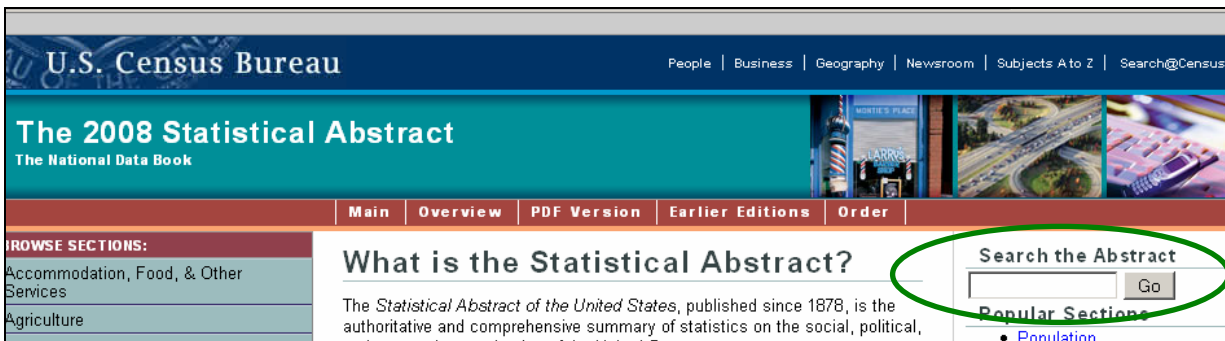

Figure 5. Example of Search Bar Specific to the Site.

3.6.2 Medium-Priority Issues

These issues caused participants to struggle; however, the participant was eventually able to overcome the issue and complete the task successfully.

3.6.2.1 Multiple Ways to Get Data

The "Get Data" link in the top navigation takes users off the Economic Census Web site to the American FactFinder Web site. Of the six times in this study that the link was clicked, participants

were confused and hesitant about what they should do next. Most did not realize that they had been taken off the Economic Census Web site. In fact, people expect that the list of links at the top of the page will keep them on the same Web site and not take them to another site (Redish, 2007, p.258). Furthermore, the "Getting Data" link on the left navigation takes users to a different place - to specific information about the Economic Census.

Recommendation: Combine the "Using American FactFinder," "Get Data," and "Getting Data" links into one link. For example, eliminate the "Using American FactFinder" link from the top navigation, and when users click on "Get Data" on the top navigation, the first page will be the one that currently is under "Using American FactFinder." This page gives information about how to get data, how to manipulate data, how to save data, etc. The first link on the "Using American FactFinder" page takes users off the Economic Census Web site onto the American FactFinder Web site. This route of getting data while gaining information from the Web site is more consistent with what users expect (Redish, 2007), as they are not expecting to be taken off the Economic Census Web site when they click on "Get Data." In addition, add a link on this page that specifies how to find codes that are relevant for Economic Census data, presently the page that a user gets by clicking on the "Getting Data" in the left navigation. Then, from there, users can find more information about codes, or if they are expert users, they can go right on to AFF. Both the top navigation and left navigation links should have the same name.

American Community Survey (ACS) uses a similar route for users to get data. See Figure 6. We do not recommend following the exact layout that ACS currently uses, but rather use this as a template for an intermediary page between "Get Data" and American FactFinder. Include on this page the two lines that are currently at the top of the "Using American FactFinder" page that introduce American FactFinder.

Figure 6. Example of Intermediary Page Before Going to American FactFinder.

3.6.3 Low-Priority Issues

These problems caused minor annoyances but did not interfere with the flow of the tasks.

3.6.3.1 Methodology Section

The first sentence on the Methodology Web page claims that, "This methodology section contains general information about how the 2007 Economic Census was collected and processed." However, there is hardly any information on the Web page that discusses the Methodology, which is what it claims to do. See Figure 5 for the present design. When participants arrived at the page, they wanted to continue forth to find more information.
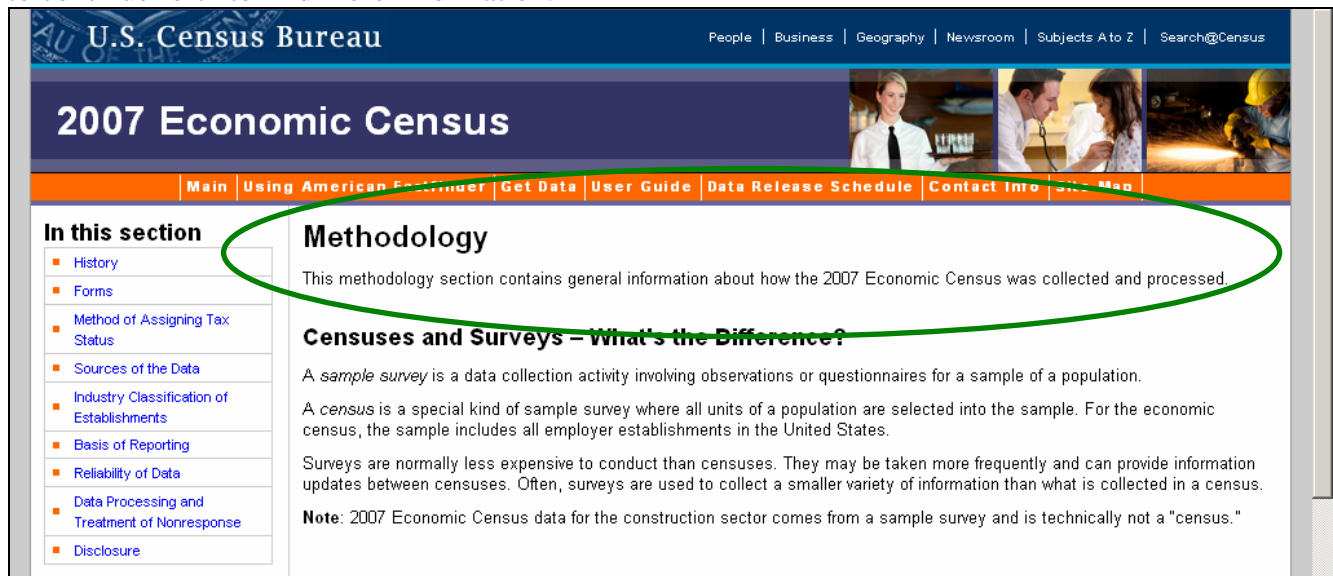

Figure 7. Current Methodology Page.

     Recommendation: Add more details about how 2007 Economic Census data was collected and processed. A user who is seeking this information will want more details than are presently on the page.

3.6.3.2 Contacts by Industry

Presently the Contacts by Industry do not seem organized in a systematic way. This did not prevent mostt participants from finding the information. However, as most lists in our environment are alphabetized, users would expect this contact list to be too.

     Recommendation: Alphabetize the list of contacts. Users tend to use previous knowledge to make inferences and expectations about the physical world and so would expect that this list would be in alphabetical order (Forsythe, Grose & Ratner, 1998, p.27). Although this did not lead to user difficulty in this study, alphabetizing the list may prevent future users from taking more time than is needed to find the contact information or from giving up altogether.

4.0 Conclusions

Overall, the software user interface supported the participants well in six of the ten tasks (as measured by an accuracy of 71 percent or better). We recommend implementing the recommended changes for the high priority issues first, and then the medium and low priority issues, if time permits. Upon completion of all changes, we recommend conducting further usability testing to evaluate whether the changes to the user interface support users in achieving their goals at the Economic Census Web site.

We request feedback from the design team on their decisions about implementing our recommendations.

5.0 References

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Appendix A

Areas of Interest (AOIs).

Participant 1:

Participants 2, 3, 4, 5, 6, 7*:

*After the first usability test, some minor changes were made to the Web site main page.

Appendix B

General Introduction.

Thank you for your time today. My name is (Test Administrator). I work here in the U.S. Census Bureau Usability Lab, and I will be working with you today. In this lab, we evaluate how easy or difficult Census products are to use. We bring in people like you who are potential users of our products to try them out while there is still time to make changes to them. What works well, we keep. When potential users such as you have difficulty with something, we have an opportunity to fix it.

Today, we will be evaluating the Economic Census Web site by having you work on several tasks. There are two parts to our session. First, you will complete 10 tasks using the Economic Census Web site. Then, at the end of the session, you'll fill out a questionnaire about your experience during the session. The entire session should last about an hour.

Before we start, there is a form I would like you to read and sign. It explains the purpose of today's session and your rights as a participant. It also informs you that we would like to videotape the session to get an accurate record of your feedback. Only those of us connected with the project will review the tape and it will be used solely for research purposes. Your name will not be associated with the tape or any of the other data collected during the session.

[Hand consent form; give time to read and sign; sign own name and date.]

Thank you.

Before we start, I want to tell you that you can't make a mistake or do anything wrong here. Difficulties you may run into reflect the design of the Web site, not your skills or abilities. This product is intended for people like you. Where it works well, that's great. But if you have a problem using parts of it, do not blame yourself.

Your experience with the site is an essential part of our work. We are going to use your comments and data as well as comments and data from the other participants to give feedback to the developers of the site. Your comments and thoughts will help the developers make changes to improve the site. I did not create the site, so please do not feel like you have to hold back on your thoughts to be polite. We are not evaluating you or your skills, but rather you are helping us see how well the site works. Please share both your positive and negative reactions to the site. And remember, there are no right or wrong answers.

In addition to the tasks I am about to give you, we are also going to do some eye tracking to record where you are looking on the screen. It will be very simple. In a moment we will do a very short simple task that will allow the computer to find your eyes.

I am going to give you 10 tasks to work on. Your comments are very important to us. I'd like you to tell me your impressions and thoughts as you work through the tasks. So give me your open impressions, both good and bad of what you see and what you experience on the site.

While you are working, I'd like you to think aloud. In other words, I'd like you to tell me what you are thinking, describe the steps you are taking, what you are expecting to see, why you are doing what you are doing, what you are going to do, and why. Tell me why you clicked on a link or where you

expect the link to take you. Tell me if you are looking for something and what it is and whether you can find it or not.

Ok, now we will practice thinking aloud. *[open www.census.gov and do practice question.]*

Ok, that was fine. Do you have any questions about the "think-aloud" process we've just practiced and that I have asked you to use?

Here are your task questions. When we are ready to begin, you will be working with them. Also, here is the questionnaire you will complete at the very end. I will tell you when to complete this.

[Set the task questions and questionnaire by participant.]

I am going to go around to the other room and do a sound check. While I am doing that, please take a moment to complete this computer usage and internet experience questionnaire. I am going to leave, but we will still be able to communicate through a series of microphones and speakers. Do you have any questions?

[Hand computer experience form, and go into control room.]

[Start video recording.]

Now I am going to calibrate your eyes for the eye tracking. I am going to have you position yourself in front of the screen so that you can see your nose in the reflection at the bottom of the monitor. To calibrate your eyes, please follow the blue dot across the screen with your eyes.

[Do Calibration]

Now that we have your eyes calibrated, we are ready to begin. For the next <u>60 minutes,</u> I will ask you to work on the 10 tasks. We will begin each task by having you read the task question out load. As you work, remember to talk to me about what you are thinking and feeling. Once you have found the information you are looking for please state your answer aloud. For example, say, "My answer is ---" or "This is my final answer" and please write your answer on the sheet too. After each task, I will return you to the page where you can begin the next task.

Appendix C

Consent Form
For Individual Participants
Usability Testing of the Economic Census Web Site

Each year the Census Bureau conducts many different usability evaluations. For example, the Census Bureau routinely tests the wording, layout and behavior of products, such as Web sites and online surveys and questionnaires in order to obtain the best information possible.

You have volunteered to take part in a study to improve the usability of the Economic Census Web site. In order to have a complete record of your comments, your usability session will be videotaped. We plan to use the tapes to improve the design of the product. Only staff directly involved in the research project will have access to the tapes. Your participation is voluntary and your answers will remain strictly confidential.

This usability study is being conducted under the authority of Title 13 USC. The OMB control number for this study is 0607-0725. This valid approval number legally certifies this information collection.

I have volunteered to participate in this Census Bureau usability study, and I give permission for my tapes to be used for the purposes stated above.

Researcher's Name: _____

Researcher's Signature: _____ Date: _____

Participant's Name: _____

Participant's Signature: _____ Date: _____

Appendix D

Questionnaire on Computer Use and Internet Experience.

1. Do you use a computer at home or at work or both?
   (Check all that apply.)
           ___Home
           ___Work

2. If you have a computer at home,
       a. What kind of modem do you use at home?
           ___Dial up
           ___Cable
           ___Other _____
           ___Don't know

       b. Which browser do you typically use at home? Please indicate the version if you can recall it.
           ___Firefox
           ___Internet Explorer
           ___Netscape
           ___Other _____
           ___Don't know

       c. What operating system does your home computer run in?
           ___MAC OS
           ___Windows 95
           ___Windows 2000
           ___Windows XP
           ___Windows Vista
           ___Other _____
           ___Don't know

3. On average, about how many hours do you spend on the Internet per day?
           ___0 hours
           ___1-3 hours
           ___4-6 hours
           ___7 or more hours

4. Please rate your overall experience with the following:
Circle one number.

	No experience								**Very experienced**
Computers	1	2	3	4	5	6	7	8	9
Internet	1	2	3	4	5	6	7	8	9

5. What computer applications do you use?

Mark (X) for all that apply

      ___ E-mail

      ___ Internet

      ___ Word processing (MS-Word, WordPerfect, etc.)

      ___ Spreadsheets (Excel, Lotus, Quattro, etc.)

      ___ Accounting or tax software

      ___ Engineering, scientific, or statistical software

      ___ Other applications, please specify_____

For the following questions, please circle one number.

	Not Comfortable			**Comfortable**	
6. How *comfortable* are you in learning to navigate new Web sites?	1	2	3	4	5
7. Computer windows can minimize, resize, and scroll through. How *comfortable* are you in manipulating a window?	1	2	3	4	5
8. How *comfortable* are you using and navigating through the Internet?	1	2	3	4	5

	Never			**Very Often**	
9. How *often* do you work with any type of data through a computer?	1	2	3	4	5
10. How *often* do you perform complex analyses of data through a computer?	1	2	3	4	5
11. How *often* do you use the Internet or Web sites to find information? (e.g., printed reports, news articles, data tables, blogs, etc.)	1	2	3	4	5

	Not familiar			**Very familiar**	
12. How *familiar* are you with the Census (terms, data, etc)?	1	2	3	4	5
13. How *familiar* are you with the current Economic Census Web site (terms, data, etc.)?	1	2	3	4	5

Appendix E

Task List.

1. You have a question about Finance & Real Estate information and would like to send an e-mail. Find the e-mail address where you should send your question.

2. You are unsure of the difference between "Places" and "Metropolitan Areas." Where would you find this information on this site?

3. When using American FactFinder, you experienced trouble getting all the columns of a table to print on the same page. Where would you find information about printing datasets?

4. Your work requires you to frequently use manufacturing data. Find the dates for all the manufacturing data to be released.

5. You are using American FactFinder and are wondering how to sort rows in descending order based on payroll. Find on the Web site where this is explained.

6. You want to access economic census data. Find an economic census data table.

7. You want to see sales per establishment for sporting goods stores in your area. Find the Web page that tells you how to do this.

8. You want to compare 2007 data to 2002 data, but are unsure if they are comparable. Find out if this information exists on the site.

9. You are an experienced economic data user and familiar with the North American Industry Classification System (NAICS). You are curious how NAICS codes have changed since the previous economic census. Find the Web page that has this information.

10. You are curious how the 2007 Economic Census was conducted. Find the information on the site.

Appendix F

Satisfaction Questionnaire.

Please circle the numbers that most appropriately reflect your impressions about using this Web -based instrument.

1. Overall reaction to the Web site:

terrible   wonderful
1   2   3   4   5   6   7   8   9   not applicable

2. Screen layouts:

confusing   clear
1   2   3   4   5   6   7   8   9   not applicable

3. Use of terminology throughout the Web site:

inconsistent   consistent
1   2   3   4   5   6   7   8   9   not applicable

4. Information displayed on the screens:

inadequate   adequate
1   2   3   4   5   6   7   8   9   not applicable

5. Arrangement of information on the screen:

logical   illogical
1   2   3   4   5   6   7   8   9   not applicable

6. Tasks can be performed in a straight-forward manner:

never   always
1   2   3   4   5   6   7   8   9   not applicable

7. Organization of information on the site:

confusing   clear
1   2   3   4   5   6   7   8   9   not applicable

8. Forward navigation:

impossible   easy
1   2   3   4   5   6   7   8   9   not applicable

9. Overall experience of finding information:

difficult   easy
1   2   3   4   5   6   7   8   9   not applicable

10. Census Bureau-specific terminology:

too frequent   appropriate
1   2   3   4   5   6   7   8   9

Additional Comments:

Appendix G

Debriefing Questionnaire.

1. Can you walk me through your thinking on why you marked (a particular QUIS item) especially low/high? (Do this for several low/high QUIS ratings).

2. What do you think of the basic screen layout?

       a. Overall?

       b. Colors?

       c. Links and information around the center pane?

       d. Context of the information on the homepage?

       e. Other?

3. What do you think of the navigational methods?

       a. Previous and Next buttons?

       b. Drop down menus across the center navigation?

       c. Links on the sides of the pages?

       d. Other?

4. What did you like best about the Web site?

5. What did you like least about the Web site?

6. Is there anything that you feel should be changed?

7. Is there anything that you feel should stay the same?

8. How easy or difficult do you feel it was to complete the tasks? What made a task easy or difficult?

9. Is there anything you would like to mention that we haven't talked about?

10. Additional Comments:

Appendix H

Standard Form 1034 September 1973 Treasury FRM 2000	PUBLIC VOUCHER FOR PURCHASES AND SERVICES OTHER THAN PERSONAL		VOUCHER NO.

U.S. DEPARTMENT, BUREAU OR ESTABLISHMENT AND LOCATION	DATE VOUCHER PREPARED	SCHEDULE NO.
U.S. Department of Commerce Bureau of the Census Washington, DC 20233-9100	CONTRACT NUMBER AND DATE	PAID BY
	REQ. NUMBER AND DATE	

PLEASE PRINT NAME & ADDRESS BELOW:

PAYEE'S NAME AND ADDRESS

DATE INVOICE RECEIVED

DISCOUNT TERMS

PAYEE'S ACCOUNT NUMBER

SHIPPED FROM	TO	WEIGHT	GOVERNMENT B/L NUMBER

NUMBER AND DATE OF ORDER	DATE OF DELIVERY OR SERVICE	ARTICLES OR SERVICES *(Enter description, item number of contract or Federal supply schedule, and other information deemed necessary)*	QUAN-TITY	UNIT PRICE COST	PER	AMOUNT
		For participating in a usability test as part of research on the Census forms Usability Laboratory Center for Survey Methods Research Statistical Research Division Received by:_____ Date:_____				$40.00

(Use continuation sheet(s) if necessary)   (Payee must NOT use the space below)
TOTAL

PAYMENT: ☐ COMPLETE ☐ PARTIAL ☐ FINAL ☐ PROGRESS ☐ ADVANCE	APPROVED FOR $40.00	EXCHANGE RATE = $1.00	DIFFERENCES	
	BY:			
	TITLE:		Amount verified correct for	$40.00
			(Signature or initials)	

Pursuant to authority vested in me, I certify that this voucher is correct and proper for payment

_____   _____   Social Science Analyst
(Date)   (Authorized Certifying Officer)   (Title)

ACCOUNTING CLASSIFICATION

Project/Task: 5907054-000; Organizational Code: 11-29-0091-50-50-00-00; Obj. Class: 25-20-04-00	
CHECK NUMBER ON TREASURER OF THE UNITED STATES	CHECK NUMBER ON (Name of Bank)
CASH DATE	PAYEE
PER	TITLE

Appendix I

Raw Behavioral Data and Eye Tracking Data.

Note: "P" = Participant. "E" = Experimenter. "NO" = Not observed. "NETD" = No eye tracking data. Eye tracking data: time taken in minutes (m) and seconds (s) to see AOIs.

Task 1: You have a question about Finance & Real Estate information and would like to send an e-mail. Find the e-mail address where you should send your question.
Participant 1
1. Success
2. Behavioral data:
    a. 2007 NAICS Search → typed "real estate" → Search → clicked on first code → back → back → back → Contact Info (top nav) → Contact by Industry
3. Eye tracking data:
    a. Top nav: 1m 29s; Left nav: NO; Main AFF Link: NO
    b. P did not look at the left navigation or the main AFF link at all.
Participant 2
1. Failure
2. Behavioral data:
    a. Contact Info → Email (Using the Data)
3. Eye tracking data:
    a. Top nav: 20s; Left nav: 19s; Main AFF link: 3s
    b. P looked at the AFF link first, then the left navigation, then the top navigation.
Participant 3
1. Failure
2. Behavioral data:
    a. Contact Info → Email (Help With AFF)
3. Eye tracking data:
    a. Top nav: NO; Left nav: NO; Main AFF link: NO
    b. P did not look at any of the AOIs.
Participant 4
1. Success
2. Behavioral data:
    a. Contact Info (top nav) → Contacts by Census or Survey → Contacts by Industry
3. Eye tracking data:
    a. Top nav: 19s; Left nav: NO; Main AFF link: 1s
    b. P looked at Main AFF link then at top navigation. P did not look at left navigation.
Participant 5
1. Success
2. Behavioral data:
    a. Contact Info (top nav) → Contacts by Industry
3. Eye tracking data:
    a. Top nav: 11s; Left nav: 22s; Main AFF link: NO
    b. P looked at top navigation then left navigation. P never looked at main AFF link.
Participant 6
1. Failure

2. Behavioral data:
    a. how to use AFF → back → Puerto Rico has Higher Homeownership, Larger Households (News) → back (trouble navigating around)
3. Eye tracking data:
    a. Top nav: NO; Left nav: NO; Main AFF link: NO
    b. P did not look at any of the AOIs.

Participant 7
1. Success
2. Behavioral data:
    a. typed "finance and real estate" in Industry Code Search box → Contact Info → Subjects A to Z (at top) → F → Finance and Insurance → back → back → back → email (help with AFF) → Contacts by Industry
3. Eye tracking data:
    a. Top nav: NO; Left nav: NO; Main AFF link: NO
    b. P did not look at any of the AOIs.

Task 2: You are unsure of the difference between "Places" and "Metropolitan Areas." Where would you find this information on this site?

Participant 1
1. Failure
2. Behavioral data:
    a. how to use AFF → Definitions and Related text → back → back → 2002 Economic Census → Geographic Area Series → clicked on a state → clicked on first PDF (did not open) → back → back → back → back → specific geography or industry → Geographic Area → Explain Census Geography (did not open)
    b. P said "But that would be my guess as to where the information would be. It would explain the terms 'places' and 'metropolitan areas'".
3. Eye tracking data:
    a. Top nav: NO; Left nav: NO; Main AFF link: NO
    b. P did not look at any of the AOIs.

Participant 2
1. Success
2. Behavioral data:
    a. Geography → Metropolitan and Micropolitan Areas → Places
3. Eye tracking data:
    a. Top nav: 1m 47s in Metropolitan Areas page; Left nav: 21s; Main AFF link: NO
    b. P looked at left navigation. Top navigation was not looked at until P arrived at the Metropolitan Areas page. P never looked at the main AFF link.

Participant 3
1. Success
2. Behavioral data:
    a. Understanding Data Sets → Using AFF (top nav) → Definitions and Related Text → Methodology → User Guide (top nav) → Notes and Cautions → Definition Changes → back → back → Understanding Data Sets → Reading Data Sets → Main → Business Classification → back → Geography → Metropolitan and Micropolitan Areas → Places
    b. P looked for terms or glossary.
3. Eye tracking data:
    a. Top nav: 16s; Left nav: NO; Main AFF link: 2s

b. P looked at main AFF link first then the top navigation. P never looked at the left navigation.

Participant 4
1. Failure
2. Behavioral data:
    a. Site Map (top nav) → temporary ignore (under FAQs) → back → definitions and related text (under AFF) → Methodology → Search@Census → typed "places and metropolitan areas" → Go → added quotations around places → Go → clicked on first option → yes (on Geo site) → read information off the page → back → back → Cartographic Products text only (towards bottom of page) → yes → back → clicked first option → yes → read information off the page again
    b. P was first looking for terms or glossary.
    c. P went off site, to the Geography site, to get the answer.
3. Eye tracking data:
    a. Top nav: 18s; Left nav: 3s; Main AFF link: 2s
    b. P looked at the main AFF link, then the left navigation, then the top navigation.

Participant 5
1. Success
2. Behavioral data:
    a. Geography → Metropolitan and Micropolitan Areas → Places
3. Eye tracking data:
    a. Top nav: 11s; Left nav: 11s; Main AFF link: NO
    b. P looked at left navigation first then top navigation. P never looked at main AFF link.

Participant 6
1. Success
2. Behavioral data:
    a. Geography → Zip Codes → back → See tables → back → Metropolitan and Micropolitan Areas → Places
3. Eye tracking data:
    a. Top nav: NO; Left nav: 25s; Main AFF link: NO
    b. P never looked at top navigation or the main AFF link.

Participant 7
1. Success
2. Behavioral data:
    a. User Guide (top nav) → back → typed "places vs. metropolitan areas" in Industry search box → back → typed "metropolitan areas" in Industry search box → back → typed "glossary" in Industry search box → back → User Guide (top nav) → Geography → Places → Metropolitan and Micropolitan Areas
3. Eye tracking data:
    a. Top nav: 3m 34s on Geography page; Left nav: NO; Main AFF link: 3s
    b. P looked at main AFF link. P did not look at top navigation until on the Geography page. P never looked at left navigation.

Task 3: When using American FactFinder, you experienced trouble getting all the columns of a table to print on the same page. Where would you find information about printing datasets?

Participant 1
1. Success
2. Behavioral data:

a. how to use AFF → Printing Data
3. Eye tracking data: NETD

Participant 2
1. Success
2. Behavioral data:
    a. how to use AFF → Printing Data
3. Eye tracking data:
    a. Top nav: NO; Left nav: NO; Main AFF link: 16s
    b. P never looked at top navigation or left navigation.

Participant 3
1. Failure
2. Behavioral data:
    a. Search@Census → typed "printing datasets" → back → back → forward → back → specific geography or industry (did not open) → Get Economic Census Data (main button) → 2002 Economic Census → Manufacturing → Go → Sector 31: GAS: Ind Stats for the St, MSA, Cou, Place : 2002 → Print → Cancel → Help (did not work) → FAQs (did not work)
    b. P said, "If I was printing, I'd be on a dataset, so I'd look for a link here on this page."
3. Eye tracking data:
    a. Top nav: NO; Left nav: NO; Main AFF link: NO
4. P did not look at any of the AOIs.

Participant 4
1. Failure
2. Behavioral data:
    a. using AFF (top nav) → AFF → Quick reports → (2002 Survey of Business Owners) - select from the U.S., states, counties, and more → State → Alabama → Show Results → Print → Preferences → Landscape → P said, "If that still didn't work, then…" → Related Items → P said, "I'd change the orientation of the page or…" → FAQ → back → (error on page) tried a few times
    b. P said, "Well, that's what I would do- change orientation or check in FAQs about printing."
3. Eye tracking data:
    a. Top nav: 19s ; Left nav: NO; Main AFF link: NO
    b. P did not look at left navigation or main AFF link.

Participant 5
1. Success
2. Behavioral data:
    a. Uses of the Data → back → how to use AFF → Column Actions → Printing Data
3. Eye tracking data:
    a. Top nav: 2m 37s on Printing Page; Left nav: 17s; Main AFF link: NO
    b. P looked at left navigation. P did not look at top navigation until on the Printing page. P never looked at main AFF link.

Participant 6
1. Success
2. Behavioral data:
    a. how to use AFF → Printing Data
3. Eye tracking data:
    a. Top nav: NO; Left nav: NO; Main AFF link: NO

b. P did not look at any of the AOIs.

Participant 7
1. Success
2. Behavioral data:
   a. File → Print → getting data → finding the data → AFF → back → learn (how to use AFF) → Printing Data
3. Eye tracking data: NETD

Task 4: Your work requires you to frequently use manufacturing data. Find the dates for all the manufacturing data to be released on American FactFinder.

Participant 1
1. Failure
2. Behavioral data:
   a. how to use AFF → What's Available
   b. P said, "My answer is 2006, 2005, 2004 and 2003." P read the dates associated with Annual Survey of Manufactures.
3. Eye tracking data:
   a. Top nav: NO; Left nav: NO; Main AFF link: NO
   b. P did not look at any of the AOIs.

Participant 2
1. Success
2. Behavioral data:
   a. typed "manufacturing" in Industry Codes search box → back → Getting Data → back → Get Economic Census Data (main button) → Manufacturing → back → back → Uses of the Data → back → Understanding Data Sets → back → Methodology → Sources of the Data → back → Data Release Schedule (top nav) → Annual Survey of Manufactures
3. Eye tracking data:
   a. Top nav: 22s; Left nav: 17s; Main AFF link: 21s
   b. P looked at left navigation, then main AFF link, then top navigation.

Participant 3
1. Success
2. Behavioral data:
   a. (Learn more about the) Economic Census → Getting Data → back → back → Get Economic Census Data (main button) → Manufacturing → back → back → How to Use AFF → What's Available → Data Release Schedule (top nav) → Industry
3. Eye tracking data:
   a. Top nav: 1s; Left nav: 12s; Main AFF link: NO
   b. P looked at top navigation then left navigation. P never looked at main AFF link.

Participant 4
1. Success
2. Behavioral data:
   a. Data Release Schedule (top nav) → Qtr 1 (did not open) → Advance Report (did not open) → Date (PDF)
3. Eye tracking data:
   a. Top nav: 14s; Left nav: 12s; Main AFF link: 1s
   b. P looked at main AFF link, then left navigation, then top navigation.

Participant 5
1. Success

2. Behavioral data:
     a. Data Release Schedule (top nav) → Industry
3. Eye tracking data:
     a. Top nav: 52s; Left nav: 15s; Main AFF link: NO
     b. P looked at left navigation then top navigation. P never looked at main AFF link.

Participant 6
1. Failure
2. Behavioral data:
     a. Other Economic Data → Manufacturing (did not open) → Manufacturing (did not open) → P said, "I am kind of confused about the question. I am not sure what they are asking me. → E clarified. → back → how to use AFF → Get data (top nav) → Manufacturing
     b. E ended the task.
3. Eye tracking data:
     a. Top nav: NO; Left nav: NO; Main AFF link: NO
     b. P never looked at AOIs.

Participant 7
1. Success
2. Behavioral data:
     a. Getting Data → data items by sector table → typed "manufacturing" in NAICS Code search box → back → Using AFF (top nav) → What's Available → 2006 (Annual Survey of Manufactures) → Annual Survey of Manufactures (off site) → E instructed to go back to Econ site → back → back → Data Release Schedule (top nav) → Annual Survey of Manufacturers (did not work) → clicked on blue box (did not work) → Release Status Updates → back
     b. E ended the task.
3. Eye tracking data:
     a. Top nav: NO; Left nav: NO; Main AFF link: NO
     b. P never looked at AOIs.

Task 5: You are using American FactFinder and are wondering how to sort rows in descending order based on payroll. Find on the Web site where this is explained.
Participant 1
1. Success
2. Behavioral data:
     a. how to use AFF → Row Actions
3. Eye tracking data:
     a. Top nav: NO; Left nav: NO; Main AFF link: NO
     b. P never looked at AOIS.

Participant 2
1. Success
2. Behavioral data:
     a. how to use AFF → Row Actions
3. Eye tracking data:
     a. Top nav: NO; Left nav: NO; Main AFF link: 1s
     b. P never looked at top navigation or left navigation.

Participant 3
1. Success
2. Behavioral data:

a. how to use AFF → Row Actions
3. Eye tracking data:
   a. Top nav: 15s; Left nav: NO; Main AFF link: NO
   b. P never looked at left navigation or main AFF link.

Participant 4
1. Failure
2. Behavioral data:
   a. Using AFF (top nav) → Column Actions
   b. Top nav: 19s; Left nav: NO; Main AFF link: 1s
3. P looked at main AFF link then top navigation. P never looked at left navigation.

Participant 5
1. Success
2. Behavioral data:
   a. how to Use AFF → Row Actions
3. Eye tracking data:
   a. Top nav: NO; Left nav: NO; Main AFF link: 2s
   b. P never looked at top navigation or left navigation.

Participant 6
1. Success
2. Behavioral data:
   a. how to use AFF → Row Actions → back → Row Actions
   b. P completed the task but did not realize the information was on the screen.
3. Eye tracking data:
   a. Top nav: NO; Left nav: NO; Main AFF link: NO
   b. P did not look at any of the AOIs.

Participant 7
1. Success
2. Behavioral data:
   a. Using AFF (top nav) → Row Actions
3. Eye tracking data:
   a. Top nav: 15s; Left nav: NO; Main AFF link: 2s
   b. P looked at main AFF link then top navigation. P never looked at left navigation.

Task 6: You want to access economic census data. Find an economic census data table.
Participant 1
1. Success
2. Behavioral data:
   a. Get Economic Census Data (did not open) (success in less than a minute) → P went on to try a different route: Getting Data → Search → back → specific geography or industry → back → data items by sector → 2002 Economic Census → 2002 Zip Codes → Economic Census → Geographic Area → back → 2002 Zip Codes → Cost of Arranged transportation → ok → Clicked on a data set
   b. P said, "I kind of stumbled on it. It's not like I knew specifically what I was looking for."
3. Eye tracking data:
   a. Top nav: 3s; Left nav: NO; Main AFF link: 7s
   b. P never looked at left navigation.
Participant 2
1. Success

2. Behavioral data:
    a. Get Economic Census Data (main button) → Quick Reports → 2002 Economic Census (first option) → back → 2002 Survey of Business Owners (second option) → back → back → first option under sector (at bottom) → first option
    b. P said, "Here is an Economic Census data table."
3. Eye tracking data:
    a. Top nav: NO; Left nav: 14s; Main AFF link: 1s
    b. P looked at main AFF link then left navigation. P never looked at top navigation.

Participant 3
1. Success
2. Behavioral data:
    a. Get Economic Census Data (main button) → Mining → Mining → Go → Sector 21: GAS: Ind Stat for the State or Offshore Areas: 2002
3. Eye tracking data:
    a. Top nav: NO; Left nav: NO; Main AFF link: NO
    b. P did not look at any of the AOIs.

Participant 4
1. Failure
2. Behavioral data:
    a. 2002 Economic Census (left nav) → drill down tables → mining → back → more data → back → back → 2002 reports by state → Alabama → mining → PDF → table in PDF document
    b. P got a data table in the PDF, but this was not the data we were looking for.
3. Eye tracking data:
    a. Top nav: 14s; Left nav: 13s; Main AFF link: 2s
    b. P looked at main AFF link, then left navigation, then top navigation.

Participant 5
1. Success
2. Behavioral data:
    a. Get Economic Census Data (main button) (did not work)
    b. E ended task.
3. Eye tracking data:
    a. Top nav: 1m 7s; Left nav: 20s; Main AFF link: 43s
    b. P looked at left navigation, then main AFF link, then top navigation.

Participant 6
1. Failure
2. Behavioral data:
    a. User Guide → Uses of the Data → Develop Public Policy → back → Research → back → Locate Business Markets → back → back → Getting Data
    b. P said, "This is basically where I would go."
3. Eye tracking data:
    a. Top nav: 3m 21s; Left nav: NO; Main AFF link: 2s
    b. P looked at main AFF link then top navigation. P never looked at left navigation.

Participant 7
1. Success
2. Behavioral data:
    a. Getting Data → Data items by sector table → P said, "looks like I am in a section that has pathways to Economic data in tables. → Reading Data Sets → back → 2002 Economic Census → chose first option → ok → chose first option → P said,

"That looks like a data set."
3. Eye tracking data:
   a. Top nav: NO; Left nav: NO; Main AFF link: 2s
   b. P never looked at top navigation or left navigation.

Task 7: You want to see sales per establishment for sporting goods stores in your area. Find the Web page that tells you how to do this.

Participant 1
1. Failure
2. Behavioral data:
   a. how to use AFF (top nav) → Finding Detailed Data → Keywords (did not work)
   b. P said, "This is the page if they were live that tells me how to find data."
3. Eye tracking data:
   a. Top nav: NO; Left nav: NO; Main AFF link: NO
   b. P never looked at the AOIs.

Participant 2
1. Failure
2. Behavioral data:
   a. Using AFF (top nav) → AFF → Quick Reports → select by industry → back → back → Finding Detailed Data → Industry or Product (did not open)
3. Eye tracking data:
   a. Top nav: 26s; Left nav: 24s; Main AFF link: 38s
   b. P looked at left navigation, then top navigation, then main AFF link.

Participant 3
1. Failure
2. Behavioral data:
   a. how to use AFF → Finding Data Highlights → Economy-Wide Key Statistics (EWKS) → back → Economic Fact Sheets
3. Eye tracking data:
   a. Top nav: 1s; Left nav: NO; Main AFF link: NO
   b. P never looked at left navigation or main AFF link.

Participant 4
1. Failure
2. Behavioral data:
   a. Get Data (top nav)
   b. P kept clicking on Get Data but it did not work.
3. Eye tracking data:
   a. Top nav: 29s; Left nav: 21s; Main AFF link: 2s
   b. P looked at main AFF link, then left navigation, then top navigation.

Participant 5
1. Failure
2. Behavioral data:
   a. Business Classification → typed "sporting goods" → Search → Found code for sporting good stores → back → back → back → specific geographic or industry → Economic Census or Survey (did not work) → geographic area → county → Maryland → Montgomery → OK → industry or product → entered code from memory → Search → chose sporting good stores at bottom → Search → Main → back x 9 to get to Main page → Uses of the Data → back → Getting Data
   b. P said, "I guess this is it."

3. Eye tracking data:
    a. Top nav: 2m 6s on Business Classification page; Left nav: NO; Main AFF link: 13s
    b. P looked at main AFF link. P did not look at top navigation until on the Business Classification page. P never looked at left navigation.

Participant 6
1. Failure
2. Behavioral data:
    a. specific geography or industry → back → Geography → States → back → See tables → back → maps → back → back → Getting Data
    b. P said, "I would enter a key word and see if it would help me."
3. Eye tracking data:
    a. Top nav: NO; Left nav: 59s; Main AFF link: 2m 16s
    b. P never looked at top navigation.

Participant 7
1. Failure
2. Behavioral data:
    a. specific geography or industry → (then typed in information on AFF re. geographic area, industry, etc. and clicked around looking for a chart or table that indicated sales per establishment)
    b. P stopped and said, "I found the website that tells me how to do it. Have I done enough?" E stopped the task.
3. Eye tracking data:
    a. Top nav: NO; Left nav: NO; Main AFF link: 2s
    b. P never looked at top navigation and left navigation.

Task 8: You want to compare 2007 data to 2002 data, but are unsure if they are comparable. Find out if this information exists on the site.
Participant 1
1. Failure
2. Behavioral data:
    a. What's New for 2007 → back → Understanding Data Sets → Changes to the Data
3. Eye tracking data:
    a. Top nav: NO; Left nav: 1m 4s; Main AFF link: NO
    b. P never looked at top navigation or main AFF link.

Participant 2
1. Failure
2. Behavioral data:
    a. Getting Data → list of data items → back → back → 2002 Economic Census → Comparative Statistics → back → back → Understanding Data Sets → Get Data (top nav) → Search for data sets (by keyword) → typed "2007 data" → Search
    b. E stopped task.
3. Eye tracking data:
    a. Top nav: 5m 18s on Understanding Data Sets page; Left nav: 19s; Main AFF link: 2s
    b. P looked at main AFF link then left navigation. P did not look at top navigation until on Understanding Data Sets page.

Participant 3
1. Failure
2. Behavioral data:

        a. What's New for 2007 → back → Getting Data → Finding the Data → back → back → 2007 Business Expenses → back → Understanding Data Sets → back → Other Economic Data → back → Understanding Data Sets → get Data → Quick Reports → chose first option → selected Mining → show results → back x 6 to Main page → Search@Census → typed "Core Business Statistics Series → Go → Comparative Statistics: 2002 (first option) → back → added "2007" to Search → Go → added "Comparison" to Search → Go → back x3

        b. E ended task.

   3. Eye tracking data:

        a. Top nav: 2s; Left nav: 48s; Main AFF link: NO

        b. P looked at top navigation then left navigation. P never looked at main AFF link.

Participant 4

   1. Failure

   2. Behavioral data:

        a. 2002 Economic Census → What's New for '07 → back → Comparative Statistics → back → back → back → Get Data (did not work) → typed "mining" into Search → chose first option → back → back → 2007 Business Expenses → 2007 Economic Census in Economic Related Data (on bottom) → Find out More About 2007 Economic Census → back → back → P said, "I guess I could click back and forth between 2007 and 2002." → Geographic Area → States → Home → back → Main → 2007 Business Expenses → Get Economic Census Data (main button) (did not open)

        b. E ended task.

   3. Eye tracking data:

        a. Top nav: 19s; Left nav: 15s; Main AFF link: 2s

        b. P looked at main AFF link, then left navigation, then top navigation

Participant 5

   1. Success

   2. Behavioral data:

        a. Notes and Cautions → back → Uses of the Data → back → Notes and Cautions → Different Data Sources

   3. Eye tracking data:

        a. Top nav: 64s on Notes and Cautions page; Left nav: 17s; Main AFF link: 23s

        b. P looked at left navigation then main AFF link. P did not look at top navigation until on Notes and Cautions page.

Participant 6

   1. Failure

   2. Behavioral data:

        a. 2007 Business Expenses → back → 1997 Economic Census → back → Getting Data → back → Other Economic Data → 2002 (Economic Census) → back → 2007 (Quarterly Financial Reports) → back

        b. E ended task.

   3. Eye tracking data:

        a. Top nav: NO; Left nav: 27s; Main AFF link: NO

        b. P never looked at top navigation or main AFF link.

Participant 7

   1. Failure

   2. Behavioral data:

        a. What's New for 2007? → Revised Industry Classification System → P said,

''selected data…Is that enough to answer that?" E said no. → 2007 North American Classification System (at top) → NTIS web site → back → P said, "I should be able to find the table that shows the correspondence between the two for the codes that changed either in this manual or on this web site. Am I close enough?" E said, "Is that your final answer?" P said, "Um, now I am hesitating that I am not looking for NAICS data but Census data in general." → back → back → Get Data (top nav)

      b. E ended task.
   3. Eye tracking data:
      a. Top nav: 24s on Revised Industry Classification System page; Left nav: 14s; Main AFF link: 3s
      b. P looked at main AFF link then left navigation. P did not look at top navigation until on Revised Industry Classification System page.

Task 9: You are an experienced economic data user and familiar with the North American Industry Classification System (NAICS). You are curious how NAICS codes have changed since the previous economic census. Find the Web page that has this information.

Participant 1
   1. Success
   2. Behavioral data:
      a. Methodology → History → "Historical Development of the Economic Census" (nothing appeared on the screen) → back → back → Industry Classification of Establishments → Program and Sector Specific Methodology → back → Business Classification → Revisions → chose first option (did not open)
      b. P said, "This isn't working, but this is my answer. This would be the page that has the information on how these codes have changed."
   3. Eye tracking data:
      a. Top nav: 2m 42s on Program and Sector Specific Methodology page; Left nav: NO; Main AFF link: NO
      b. P never looked at left navigation and main AFF link. P did not look at top navigation until on Program and Sector Specific Methodology page.

Participant 2
   1. Failure
   2. Behavioral data:
      a. typed "NAICS" in Industry Code search box → back → typed "North American Industry Classification System" in Industry Code search box → back → typed "codes" in Industry Code search box → back → Get Economic Census Data (main button) → North American Industry Classification System (NAICS) → 2007 NAICS codes--2- through 6-digit (did not open) → 2007 NAICS codes--6-digit only → back → (tried others)
      b. P decided that this was the page that she needed for the information.
   3. Eye tracking data:
      a. Top nav: 1m 6s; Left nav: 1m 20s; Main AFF link: 3m 5s
      b. P looked at left navigation, then top navigation, then main AFF link.

Participant 3
   1. Failure
   2. Behavioral data:
      a. typed "NAICS" in Industry Code search box → back → 2002 Economic Census → NAICS → correspondence between NAICS 97 and NAICS 02 → Table 1 → back

→ Table 2 → More → back
b. P said, "I guess this is my final answer. These six codes have changed: mining, construction, wholesale trade, retail trade, information and #56."
3. Eye tracking data:
a. Top nav: NO; Left nav: 3s; Main AFF link: 55s
b. P looked at left navigation then main AFF link. P never looked at top navigation.

Participant 4
1. Failure
2. Behavioral data:
a. Typed "mining" in Industry Codes search box → clicked on first code
b. P thought this was the correct answer. This tells the different codes for the different years, specific to mining.
3. Eye tracking data: NETD

Participant 5
1. Success
2. Behavioral data:
a. What's New for 2007 → Revised Industry Classification System
3. Eye tracking data:
a. Top nav: 25s; Left nav: 24s; Main AFF link: NO
b. P looked at left navigation then top navigation. P never looked at main AFF link.

Participant 6
1. Failure
2. Behavioral data:
a. Economic Census → Getting Data → Geographic Area/Sector
b. P said, "This is as far as I can go and I would probably play with this."
3. Eye tracking data:
a. Top nav: NO; Left nav: 1m; Main AFF link: NO
b. P never looked at main navigation and main AFF link.

Participant 7
1. Success
2. Behavioral data:
a. What's New for 2007? → Revised Industry Classification System
3. Eye tracking data:
a. Top nav: 21s; Left nav: NO; Main AFF link: NO
b. P never looked at left navigation and main AFF link.

Task 10: You are curious how the 2007 Economic Census was conducted. Find the information on the site.
Participant 1
1. Success
2. Behavioral data:
a. What's New for 2007 → Getting Data → back → Methodology
b. P did not think there was enough information here and wanted to continue forward.
3. Eye tracking data:
a. Top nav: NO; Left nav: 1m 25s; Main AFF link: NO
b. P never looked at top navigation and main AFF link.

Participant 2
1. Failure
2. Behavioral data:

a. Get Economic Census Data (main button) → About the Data → Censuses and Surveys
b. P found information about each survey and thought she had completed the task.
3. Eye tracking data:
    a. Top nav: 23s; Left nav: 15s; Main AFF link: 2s
    b. P looked at main AFF link, then left navigation, then top navigation.

Participant 3
1. Success
2. Behavioral data:
    a. Methodology
3. Eye tracking data:
    a. Top nav: 32s on Methodology page; Left nav: 11s; Main AFF link: NO
    b. P looked at left navigation. P did not look at top navigation until on Methodology page. P never looked at main AFF link.

Participant 4
1. Success
2. Behavioral data:
    a. read more → Methodology
3. Eye tracking data:
    a. Top nav: 21s; Left nav: 18s; Main AFF link: 2s
    b. P looked at main AFF link, then left navigation then top navigation.

Participant 5
1. Success
2. Behavioral data:
    a. What's new for 2007 → back → User Guide → Methodology
    b. P wanted to go further. E stopped the task.
3. Eye tracking data:
    a. Top nav: 43s; Left nav: 13s; Main AFF link: NO
    b. P looked at left navigation then top navigation. P never looked at main AFF link.

Participant 6
1. Failure
2. Behavioral data:
    a. Get Economic Census Data Now (main button) → Quick Reports → back → back→ Economic Census → What's New For 2007? → Change of Publication Formats → back → back → What's New for 2007?
    b. E ended task.
3. Eye tracking data: NETD

Participant 7
1. Success
2. Behavioral data:
    a. Methodology
    b. P wanted to continue forward and find more information. E stopped the task.
3. Eye tracking data:
    a. Top nav: NO; Left nav: NO; Main AFF link: NO
    b. P did not look at any of the AOIs.