Web Screen Presentation Using Blaise 5

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1 Introduction: Challenges Moving CBECS to Web

This paper describes the challenges faced while adopting Blaise 5 for use on a web survey for the Commercial Buildings Energy Consumption Survey (CBECS). The CBECS periodically collects energy consumption and expenditure data from U.S. commercial buildings. This requires an extensive listing process to develop the sample frame, followed by about six months of field data collection. The survey is relatively long and complex, covering detailed aspects of building size and use, and energy consumption from several energy sources. There are additional complications when we encounter strip shopping centers or other variations on commercial buildings.

For several data collection cycles, dating back to 1999, CBECS has used Blaise for CATI and CAPI data collection. Beginning with the 2018 CBECS, the goal is to encourage respondents to complete their questionnaires on the web, and it is expected that approximately 40% of cases will be collected via web, with the remainder collected via CAPI. This transition to web data collection naturally suggests a move to Blaise 5. However, during the course of gathering requirements, the U.S. Energy Information Administration (EIA) and Westat identified several challenges around the conversion of a CAPI instrument to web. These challenges fall into two categories.

- First is the general look and feel of the instrument on the web: how to define elements of basic screen presentation, such as layout, font size, emphasis, branding, and color palette? How to handle graphics in question text or responses? How to position navigation buttons, and how to accommodate missing responses?
- The second category includes items more specific to fielding CBECS. For example, how should help screens be presented? How will we handle show cards, which interviewers usually use with long response descriptions? In CAPI, the screens often had optional text for interviewers to read under certain circumstances – how should we handle those on the web?

2 Process: Best Practices Working Group

When CBECS 2018 adopted Blaise 5, EIA and Westat had a great deal of experience with in-person data collection, but little experience with this instrument on the web. EIA and Westat formed a team to examine best practices for web screen presentation on CBECS. The purpose of the best practices team was to identify the key questions raised by web data collection, examine different solutions, and propose recommendations. The team used the following methods to accomplish the goal:

- The team immediately embarked on a set of discussions with expert survey methodologists at Westat and EIA. This allowed us to take a detailed look at all the elements of the design, think critically about what was on each screen, and consider carefully the effects of collection mode on data quality.

- At the same time, we conducted a literature review looking for best practices regarding web screen layout. Much of the literature consisted of suggestions or general ideas rather than concrete templates. We assembled these into a set of discussion points with our expert methodologists.

- We surveyed screen designs currently available on the web, generally from commercial services primarily engaged in providing survey capability.

- We developed an initial "style sheet," synthesizing our findings from the literature and from commonly used screen designs into an initial specification that could be applied to a web survey.

- We compiled a series of example questions that covered the range of question types present in the CBECS questionnaire. This included the basic question types: categorical, continuous, string, date, and dollar amounts, as well as more sophisticated or combined question types such as full addresses, other-specify, select all that apply, lookup tables , grids, and calendar date pickers. We identified the resulting 44 items as our evaluation questionnaire, and we used this evaluation instrument to develop, test and refine our Blaise 5 presentation style.

3 Challenge: Survey Look and Feel

As mentioned above, we began by looking for examples of web surveys in the literature and on the web, and found a wide variety of practice. For example, Figures 1 and 2 show a typical categorical question for two of the most popular commercial web survey tools, Survey Monkey and YouGov.

Figure 1. Categorical Question in Survey Monkey (desktop)

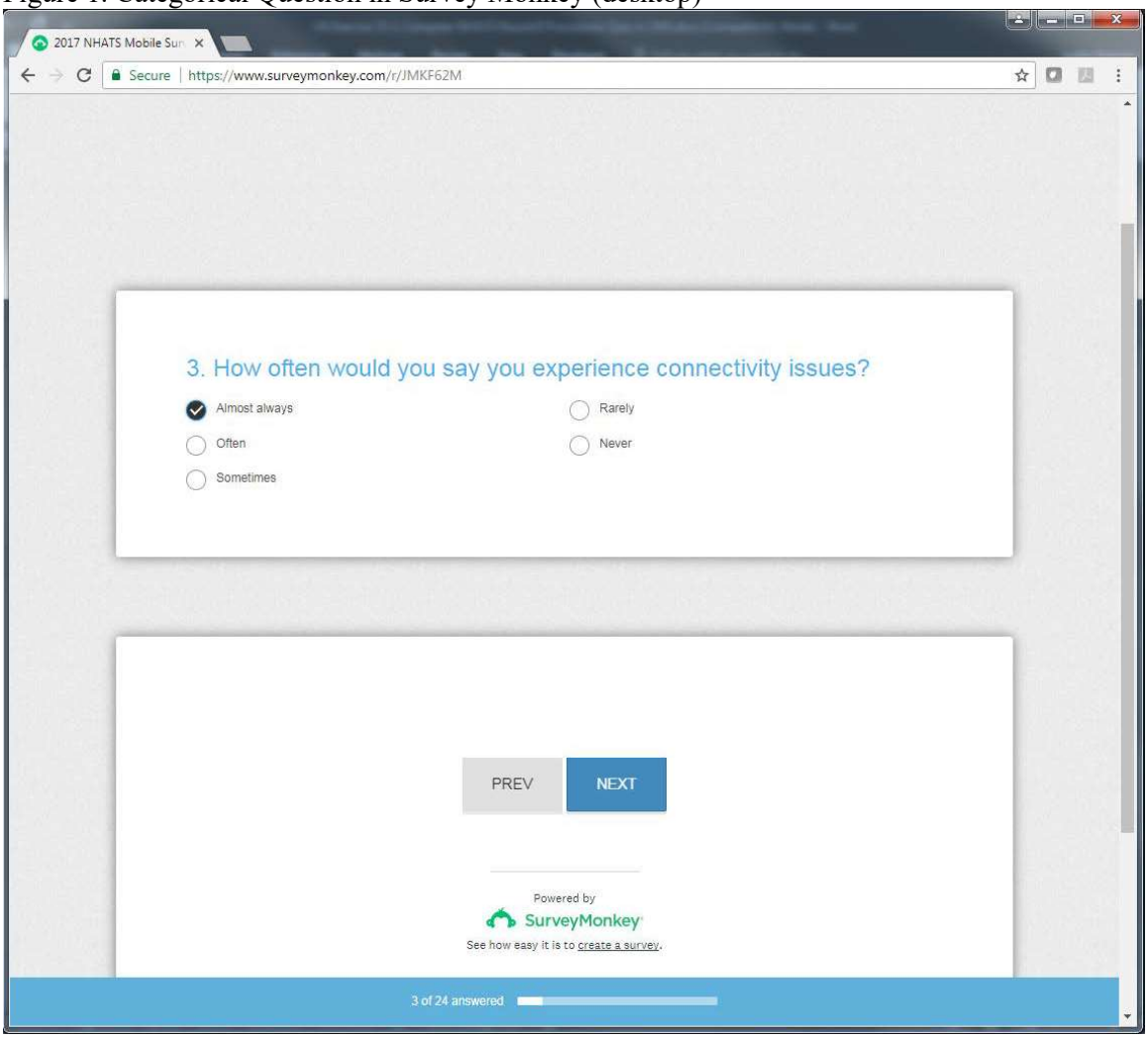
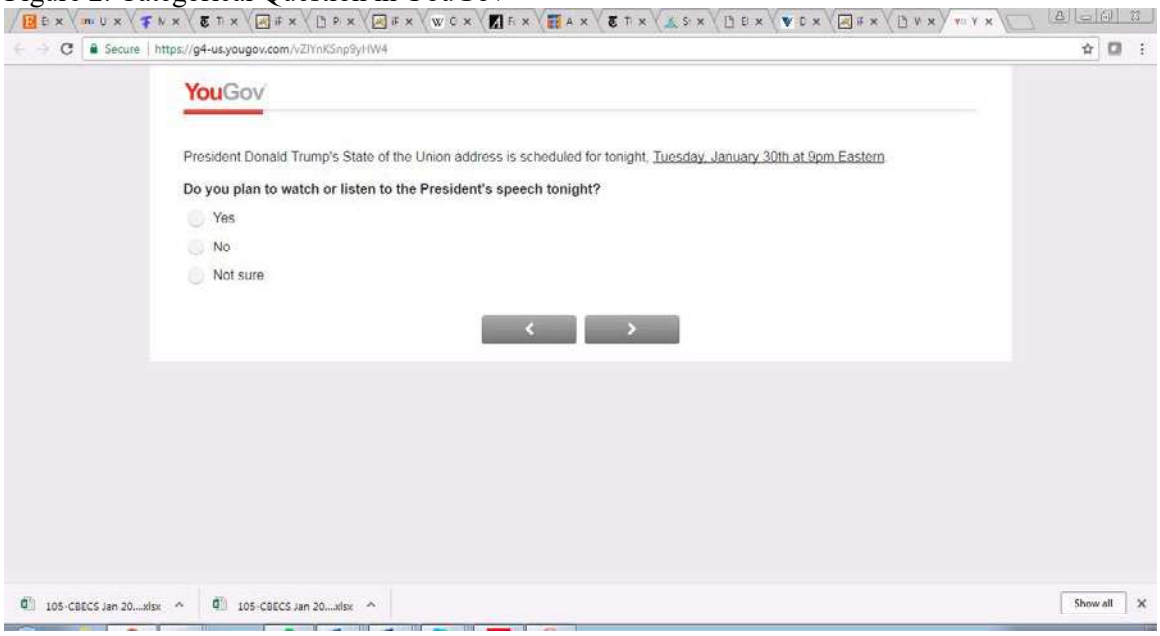


Figure 2. Categorical Question in YouGov



We also reviewed other screens built for data collection with web technology at Westat. Figure 3 shows an example of a screen using Blaise 4 with Westat Visual Survey, a proprietary extension of the Blaise rules engine that runs using web technology. Figure 4 shows an early version of a Blaise 5.2 screen. Figure 5 shows a sample screen using SurveyBuilder, another Westat system for web surveys.

Figure 3. Blaise 4 with Westat Visual Survey extension

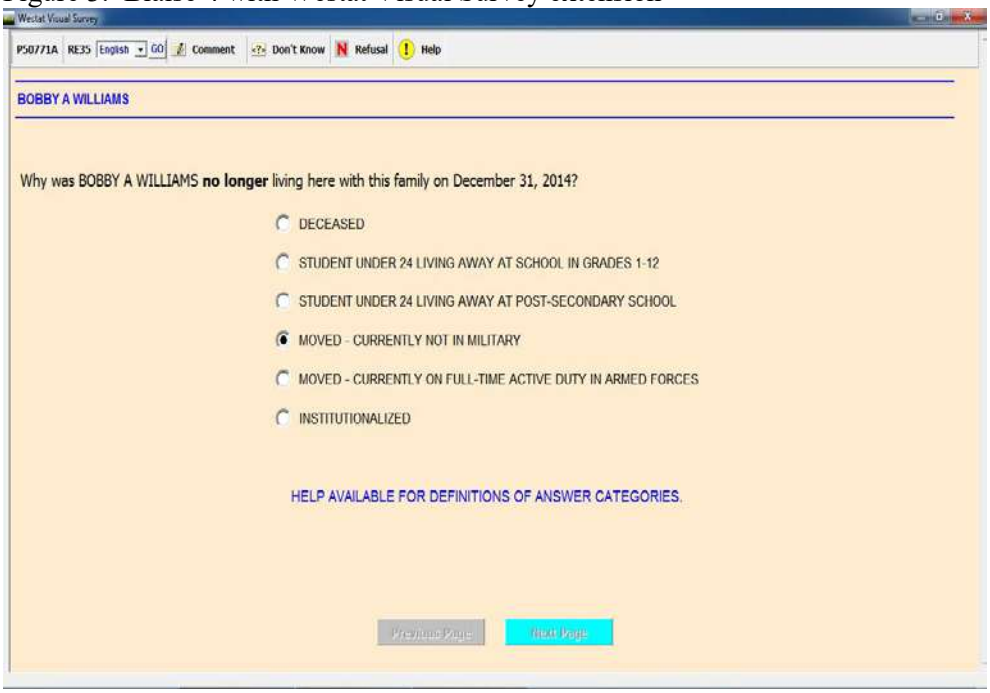


Figure 4. Early web screen using Blaise 5.2

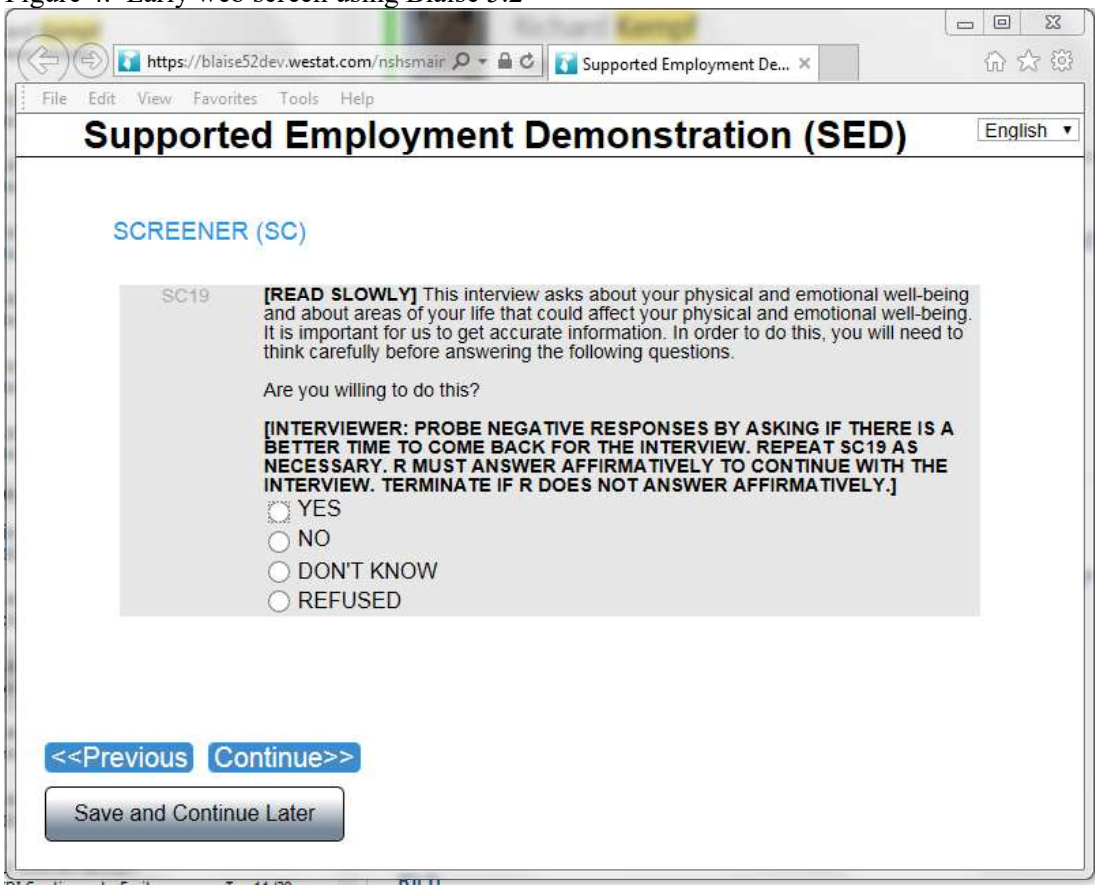
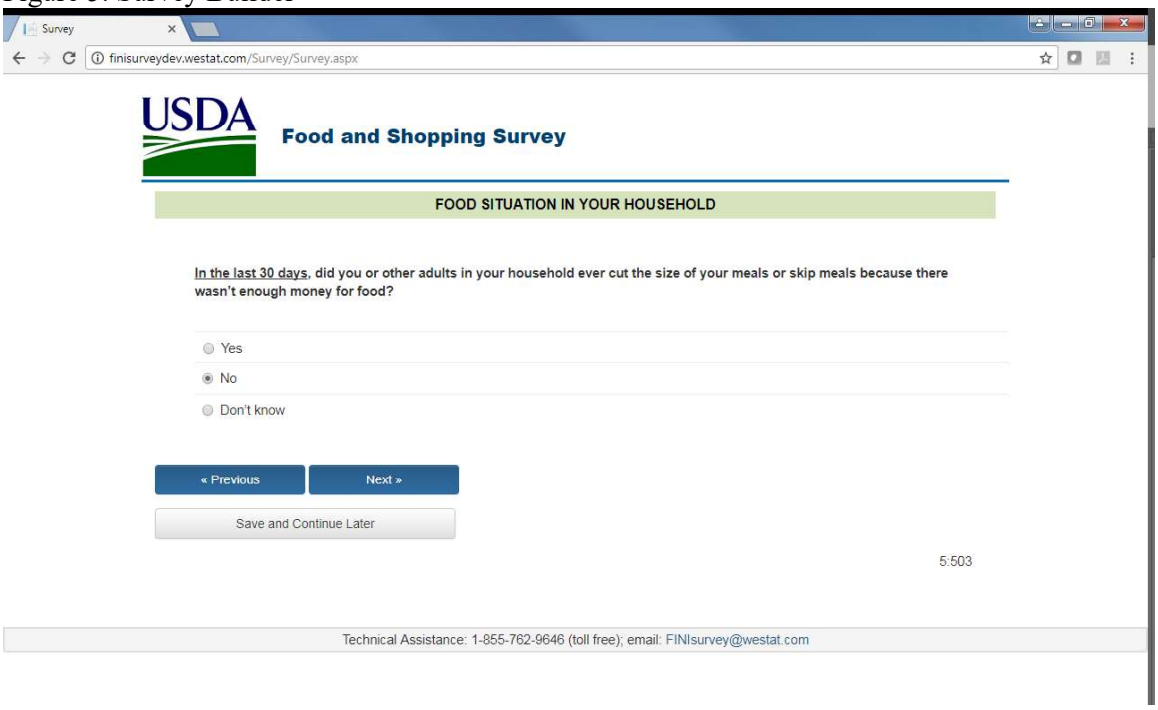


Figure 5. Survey Builder



As you can see, the approaches to web survey screen design are many and varied. We worked through the literature and discussed different approaches internally and with our expert methodologists. We also programmed several different approaches, and conducted iterative reviews with the group and senior project staff. By the fifth review cycle, we had a basic screen design that we felt comfortable taking into usability testing; Figures 6 and 7 show examples for categorical and continuous screens.

Figure 6. Sample CBECS screen for categorical item

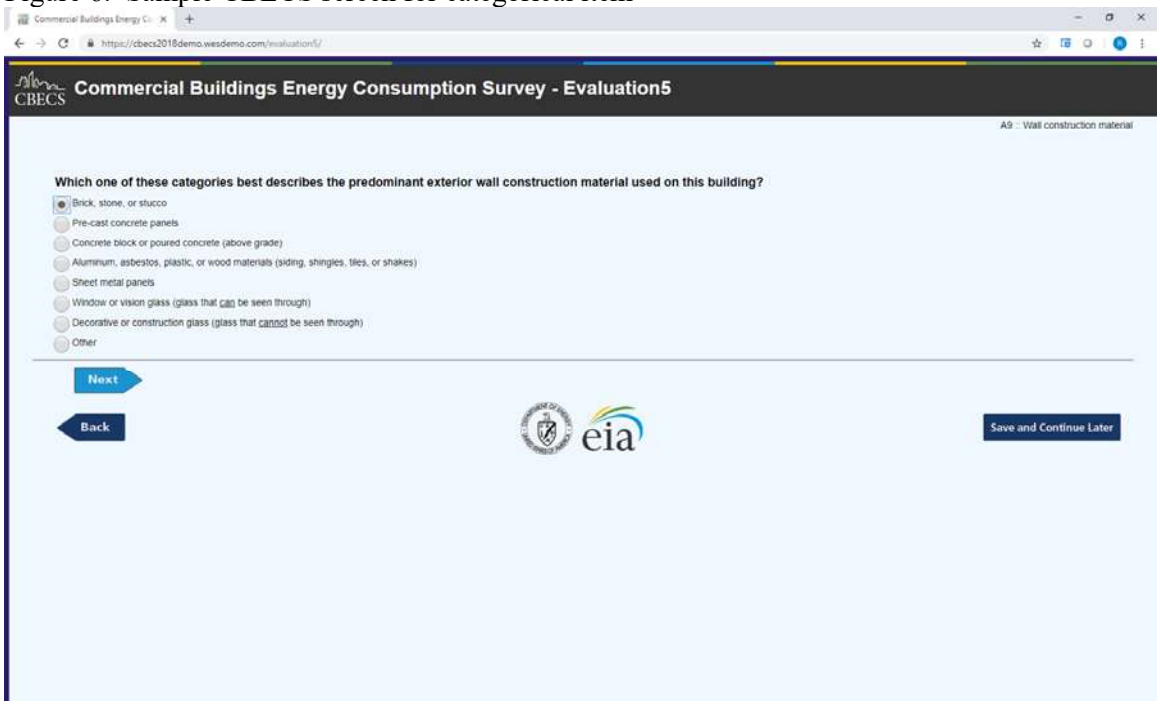
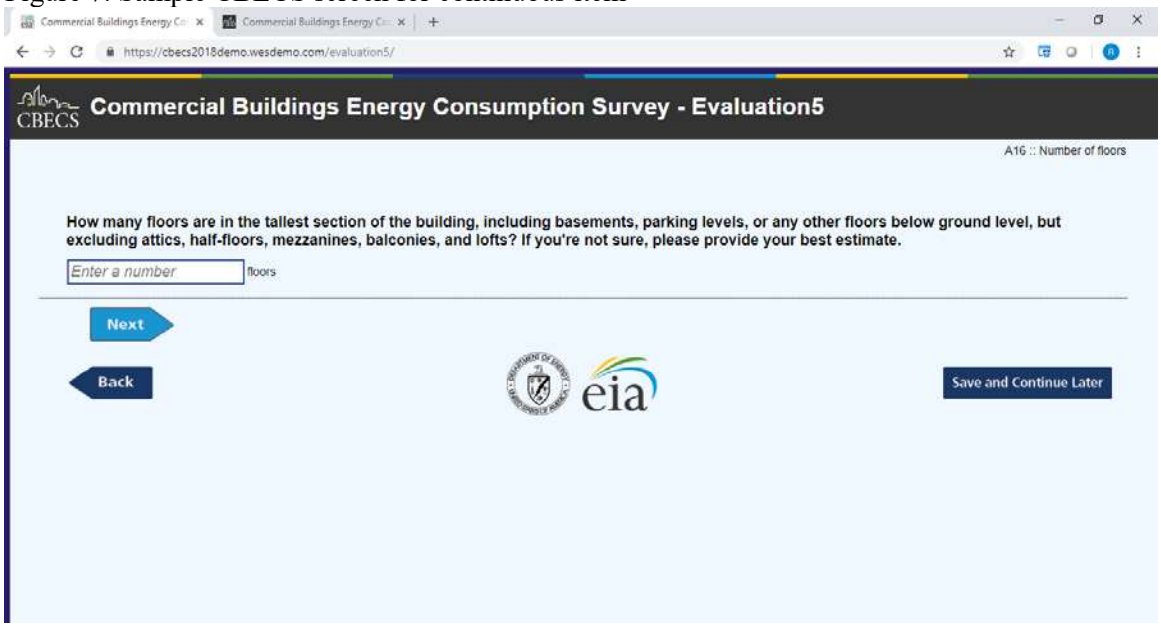


Figure 7. Sample CBECS screen for continuous item



Every part of these screens have been reviewed in some depth.

- The general look was suggested by the literature: a light background with dark text was easiest to read. Key elements of the basic look-and-feel include
    - Question text and response options are left justified and allowed to wrap
    - The text area is horizontally centered on the screen
    - Fonts in priority are Helvetica, Arial, and Sans Serif (different browsers and operating systems have access to different font families)
    - Question text is size 18 and bold, instructional text is size 18 and normal, response options are 16 and normal
- CBECS, like many projects, already had a graphical presence used for brochures and other materials, so we adapted that for the banner across the top of every page. The banner includes the project logo, and the white text on dark background contrasts with the area containing the question text and responses.
- We felt that including the official logos of the government offices supporting the survey gave the screen credibility.
- The literature and the opinion of our experts also held that we should avoid extensive use of color so it is sparing, muted, and consistent. The most prominent part of the question should be the question text – thus it is bold and somewhat larger than the response options. Question text is size 18 and bold, instructional text is size 18 and italicized, response options are size 16 and normal, and explanatory text is size 14 and italicized.
- The response options should be easy to click – therefore the radio buttons and check boxes are slightly oversized, and the entire text area is clickable. We experimented quite a bit with larger and smaller radio buttons and determined this size – slightly larger than the height of the text but with definable space between each button – worked best.
- For continuous questions, we took advantage of the watermark feature as shown in Figure 7.
- As you can see, the question is separated from the navigation buttons by a thin horizontal line.
- In our early versions, we always had the navigation area "pinned" to the bottom of the screen. However, with certain questions and browser settings, the response options may not all be visible, and the respondent may not realize that there are additional possible responses. So we let that area "float" with the question text and responses so that the respondent must scroll to the bottom, and therefore see all possible responses, before moving to the next screen.
- The Next and Back buttons went through several iterations. The goal was to provide a backup capability but draw the user to the Next button as a default. One recommendation in the literature was to align frequently-used buttons on the left side of the screen, within the respondent's line of sight while reading the response options. When we placed the Previous button on the left and the Next button on the right, consistent with the way we read text, we found that the eye was drawn to the Back button and we had to work to locate the Next button. After some trial-and-error, we preferred the Next button in the most prominent position, and made it more prominent with a lighter colored button. We decreased the prominence of the Back button by moving it under the Next button—consistent with some recommendations that this can discourage respondents from unintentionally clicking Back—but kept it slightly to the left of the Next button. This also allowed us to keep the more frequently-used navigation functions together, and to provide substantial distance from the "Save and Continue Later" button which is much more rarely used. We also experimented with text-only links (i.e., no directional arrows) and with text-free arrows, and we preferred the combined approach shown here with text included on the arrow shape. The font size is 14, consistent with the smallest of the other screen elements.

4 Challenge: CBECS Design Elements

The second major challenge in moving CBECS to the web was to accommodate design elements that had been present in the CAPI screens. One very important consideration was that the 2018 CBECS was going to be conducted via CAPI and web, and the design needed to accommodate both modes while minimizing mode effects. The goal of the best practices group became to design an approach that could be used on both modes, and in fact, we decided to use a single application in both CAPI and web modes.

4.1 Show Cards

In CAPI data collection it can be quite common to use show cards, that is, hard copy display materials that contain more information, such as extra descriptions or definitions that may not fit on a screen or may not be easily understood orally if read aloud by an interviewer. CBECS show cards may contain lengthy categorical responses, detailed explanatory text, or pictures that best describe the desired response. For example, we used to ask about the pitch of the roof, providing text responses in CAPI and example images on a show card (Figure 8). We did not want to include show card content only in CAPI mode, as we felt this could introduce an unacceptable mode effect. We briefly considered making a show card document available electronically to web respondents, but dismissed this as too unwieldy and confusing. Ultimately, after reviewing all show card text to shorten it as much as possible, we adjusted the text on the screens in both modes to include the show card text, and we continue to provide show cards to field interviewers for use in CAPI interviews. Figure 4.2 shows the revised version of the roof tilt example described above, with images now included on both the CAPI and web screens.

Figure 4.1 Example of show card used for 2012 CAPI interviews

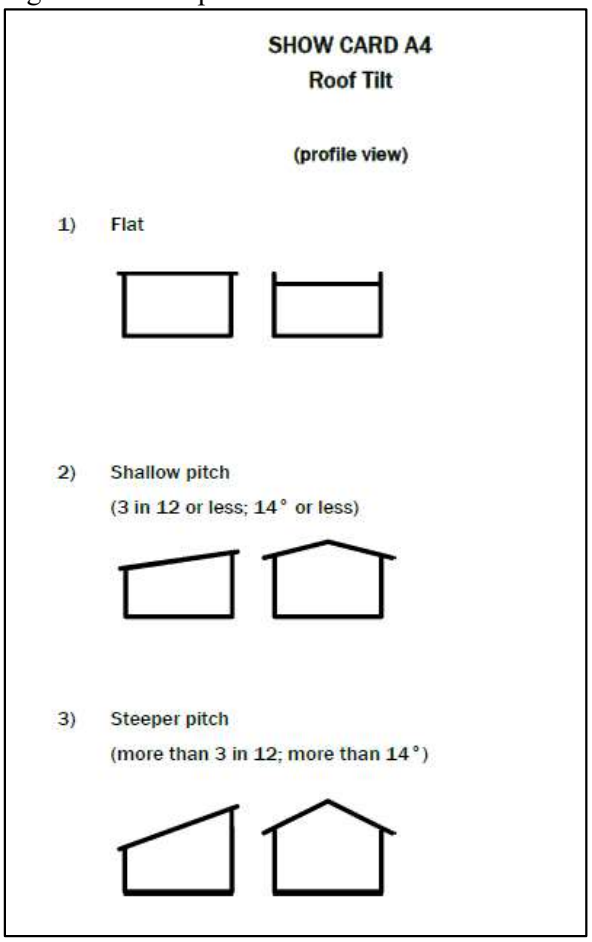
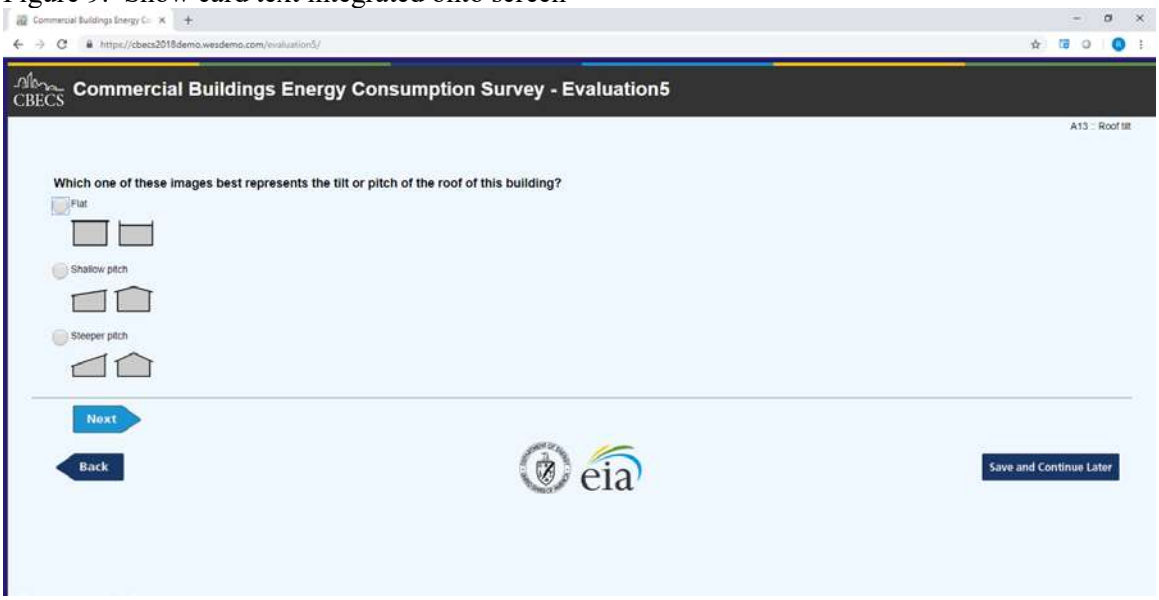


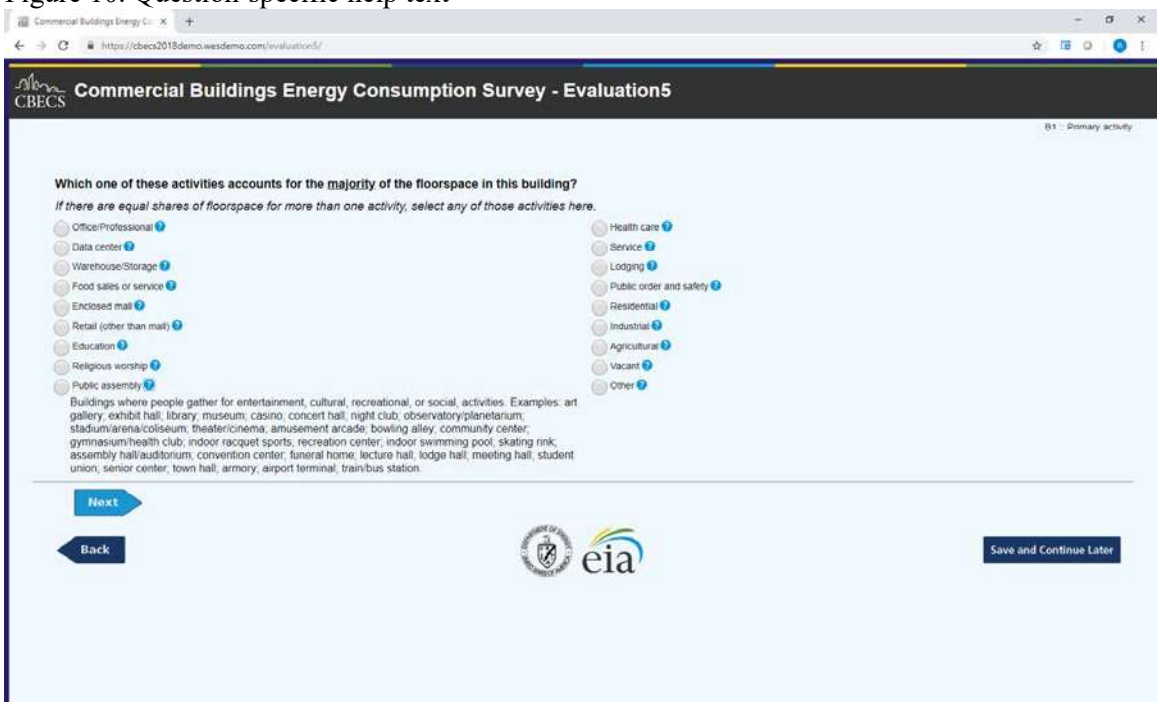
Figure 9. Show card text integrated onto screen



4.2 Question-specific help

Question-specific help was historically available throughout the CBECS questionnaire, and this information is particularly important as the instrument asks for fairly detailed technical responses. In previous CAPI data collection, we used the F1 key to allow interviewers to bring up more complete explanations, sometimes referred to as Q-by-Qs. As we moved to the web, we initially programmed messages that appeared when the cursor hovered over particular terms. These "tooltips" worked very well with mouse-based browsers, but were not available if the respondent chose to complete the questionnaire using a mobile device. After discussion and refinement through trial-and-error, we eventually settled on a blue question mark for both web and CAPI modes. Figure 4.10 shows the additional text when the button next to "Public assembly" is pressed. This functionality is used sparingly, however; reviewing the 2012 data on the incidence of help screen use showed than most were not used much, so most of them were removed and any content from help screens that we felt was particularly important was moved into question text.

Figure 10. Question-specific help text



4.3 Optional explanations and definitions

Previous versions of the CBECS sometimes included interviewer instructions, that is, additional text to guide the interviewer that was not read to the respondents. In some cases these were additional definitions, and in other cases instructions on how to handle specific situations. Clearly these would not function properly in web mode, so we either integrated them with the question text, converted them to question-specific help, or eliminated the text altogether.

4.4 Probing

Another staple of CAPI data collection is the use of probes, generally in the form of interviewer instructions providing optional text if necessary to clarify the question for the respondent. We needed a different approach for web respondents, and in general we adjusted the question text to include the probe. Figure 11 shows a typical example. In previous CAPI versions, we did not include the final sentence with language about estimating; rather, we included optional interviewer text instructing to probe for an estimate if the respondent was unsure.

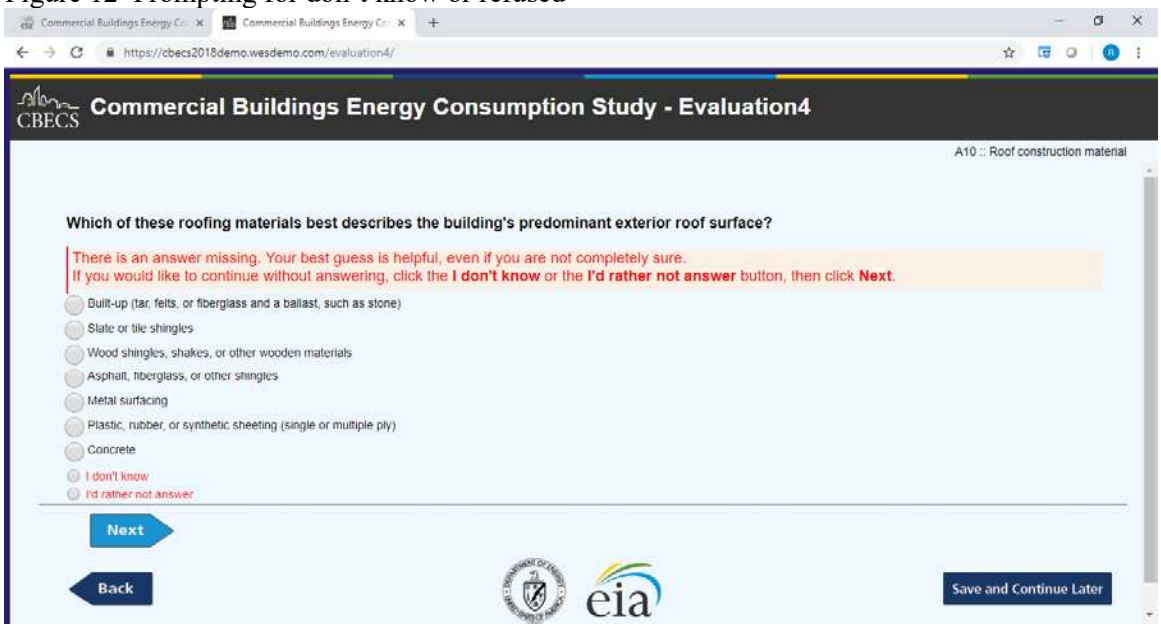
Figure 11 Probe text integrated into question

4.5 Item nonresponse: don't know and refused

One of the most challenging issues of moving the CBECS to the web was how to handle don't know and refused responses. In CAPI, the interviewers have special function keys to accommodate these responses, but the literature and expert review all agreed that we should not routinely supply "Don't know" and "Prefer not to answer" on each screen.

Our first solution was to assume that a respondent who did not know or did not care to answer would simply attempt to move past the item without answering. So we trapped those empty fields and prompted the respondent to answer using the categories or to mark don't know or refused if he or she clicked next without responding, as shown in figure 12. This approach covers respondents who inadvertently moved past the question as well as those who don't know or prefer not to answer.

Figure 12 Prompting for don't know or refused



However, a complex questionnaire often has more complex needs for missing data. For some items, we decided the best approach was to reverse course and include don't know as an explicit option when the respondent first arrives on the screen. We did this where we specifically wanted to measure respondent knowledge of a concept, or where we would rather follow up with a categorical item than accept an estimate. For instance, in Figure 13, we would rather not have a guess; a don't know response will skip to a categorical question more in line with the analytic needs of CBECS. We developed a similar approach for explicit refusals. This is the only time we were really interested in the distinction between a don't know and a refusal, so if the respondent left blank an item that did not have an explicit don't know or refusal, we just wanted to make sure the question was not missed in error, rather than press the respondent to report don't know or refusal. The revised approach is shown in Figure 14. A fourth nonresponse treatment is to allow the respondent to leave a response blank without displaying a prompt message. This will be used in limited circumstances, for example in the case of some "other/specify" responses.

Our approach to missing data caused us to add a new missing value – SK for "skipped" – in addition to the DK and RF values. If a respondent leaves an item blank, receives the missing value prompt as shown in Figure 14, and presses Next with no response, the item gets the SK attribute. The same is true if the respondent leaves blank an item with an explicit don't know or refusal. This allows us to know that the question was shown to the respondent and that he or she declined to respond.

Figure 13, Explicit don't know

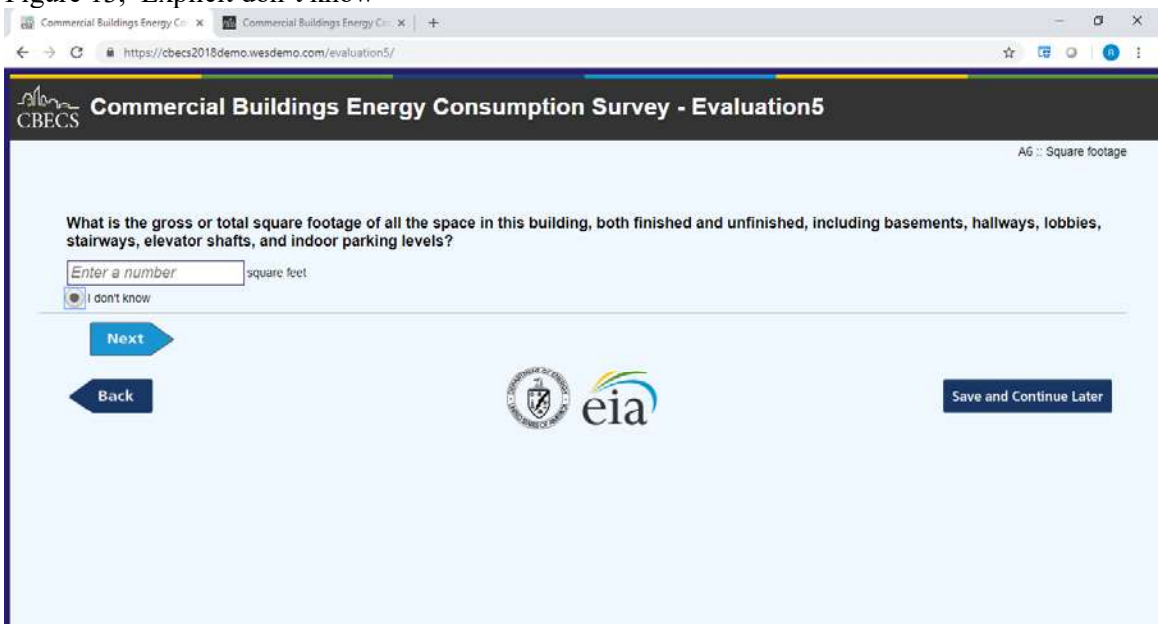
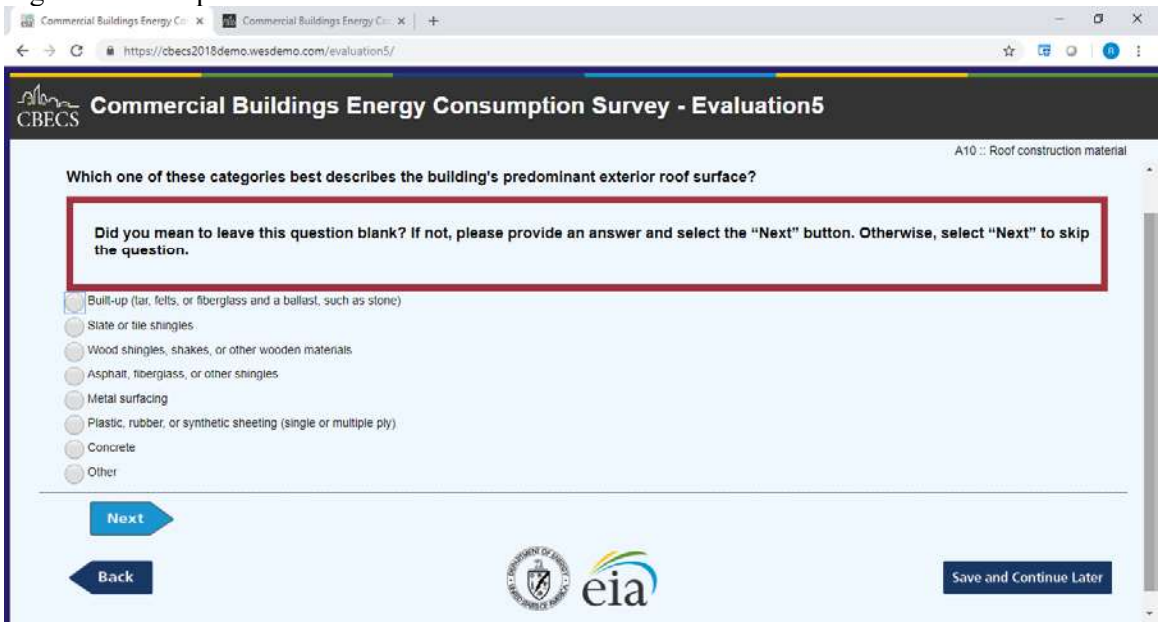


Figure 14 Prompt when answer left blank



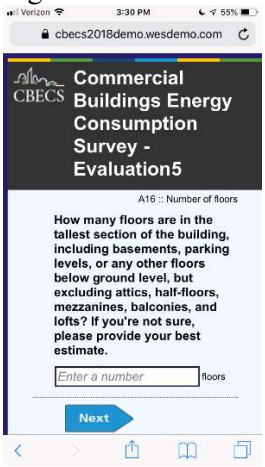
5 Additional Lessons Learned

In addition to the detailed learning on web screen presentation, this process taught us lessons in two additional areas.

5.1 Mobile

We understand that some respondents will only complete a web interview using a mobile device. This may be a personal preference, or the respondent may not have ready access to an Internet-connected desktop computer. Our preference is that the interview be completed using a desktop computer because of the complex and detailed nature of the questionnaires, but we recognize that this may not always be possible. Accordingly, the web screens may be optimized for the desktop but must also function properly on a mobile device with a much smaller form factor. Fortunately, Blaise 5 adapts very nicely to smaller form factors, and we were able to implement a working version of the web questionnaire for mobile devices very quickly. Figure 5.1 shows an example of the CBECS presentation on the mobile form factor.

Figure 15. Mobile web screen



5.2 Changes to specifications

A related lesson is that we needed to adjust our specifications to accommodate new requirements imposed by web data collection and new capabilities afforded by Blaise 5. In some cases, the text needed to change between web and CAPI modes. We needed to add specifications to contain information text behind the blue question marks, and we needed to specify the watermark text. We also needed to add the correct treatment of missing data to each item.

6 Conclusion and next steps

In general, the process we developed to analyze, design, and adapt screens from CAPI to web administration using Blaise 5 worked quite well. We were able to take advantage of deep experience on the project, we gave ourselves enough time to review and refine several iterations, and we addressed all of the major issues we could identify. Our next steps are to perform some formal usability testing and continue to improve the application incrementally based on conclusions from that testing. We feel confident that these screens will allow us to collect data that is of high quality when the study launches in early 2019.