Best Practices of Usability Testing Online Questionnaires at the Census Bureau

How rigorous and repeatable testing can improve online questionnaire design

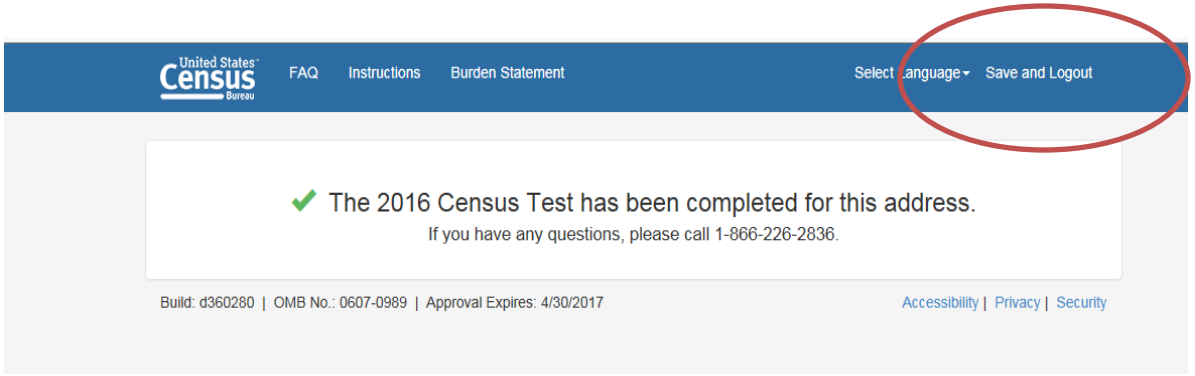
Elizabeth Nichols, Erica Olmsted-Hawala,
Temika Holland, and Amy Anderson Riemer
U.S. Census Bureau

QDET2 November 11, 2016
Miami, Florida

Concept of Usability Testing

- Usability testing shows us how users perform tasks
  - measures of efficiency, effectiveness, and user satisfaction while accomplishing tasks (ISO Standard 9241-11: 1998)

Example of a Usability Finding



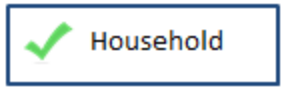
Overview of Talk

- Top 10 tips
  - How arrived at those practices
  - What still is unknown
- Success example

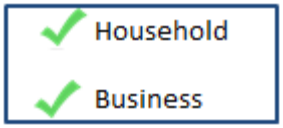
Tip 1: Participants

- 10-20 users
  - Faulkner (2003) suggests
  - 5 users recommended by Virzi (1990, 1992) and Nielsen & Landauer (1993) as described by Fox (2015)

- User groups - respondents with particular characteristics
  - "Why do you think you qualify for this study?"
  - Older respondents
    - Olmsted-Hawala & Holland, 2015; Tullis, 2007; Zaphiris & Savitch, 2008
  - Device dependent groups



- Logistical issues
  - Reminder calls and emails
  - Schedule to end a few days earlier to back-fill for no shows

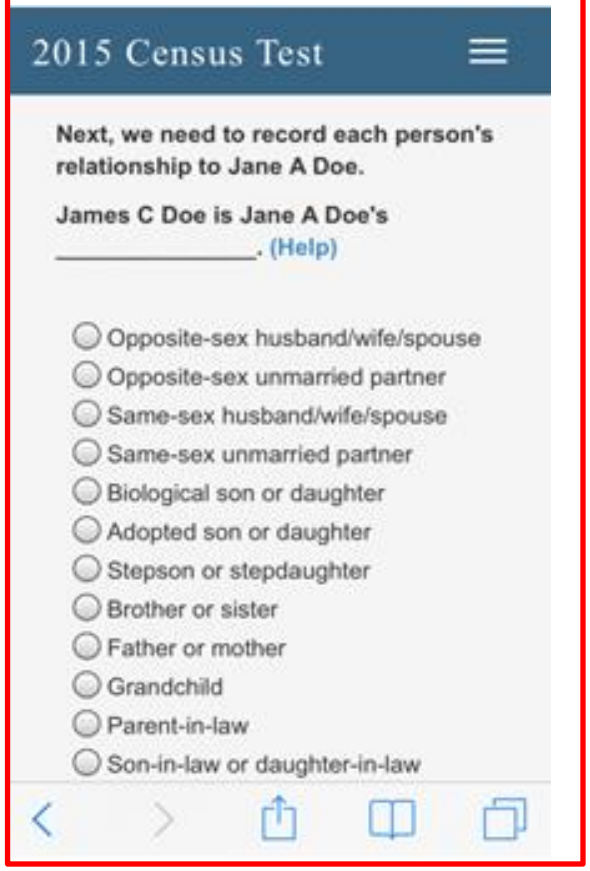


Tip 2: Iterative testing

Same survey – multiple rounds

Household

Round 1 of testing



Round 2 of testing

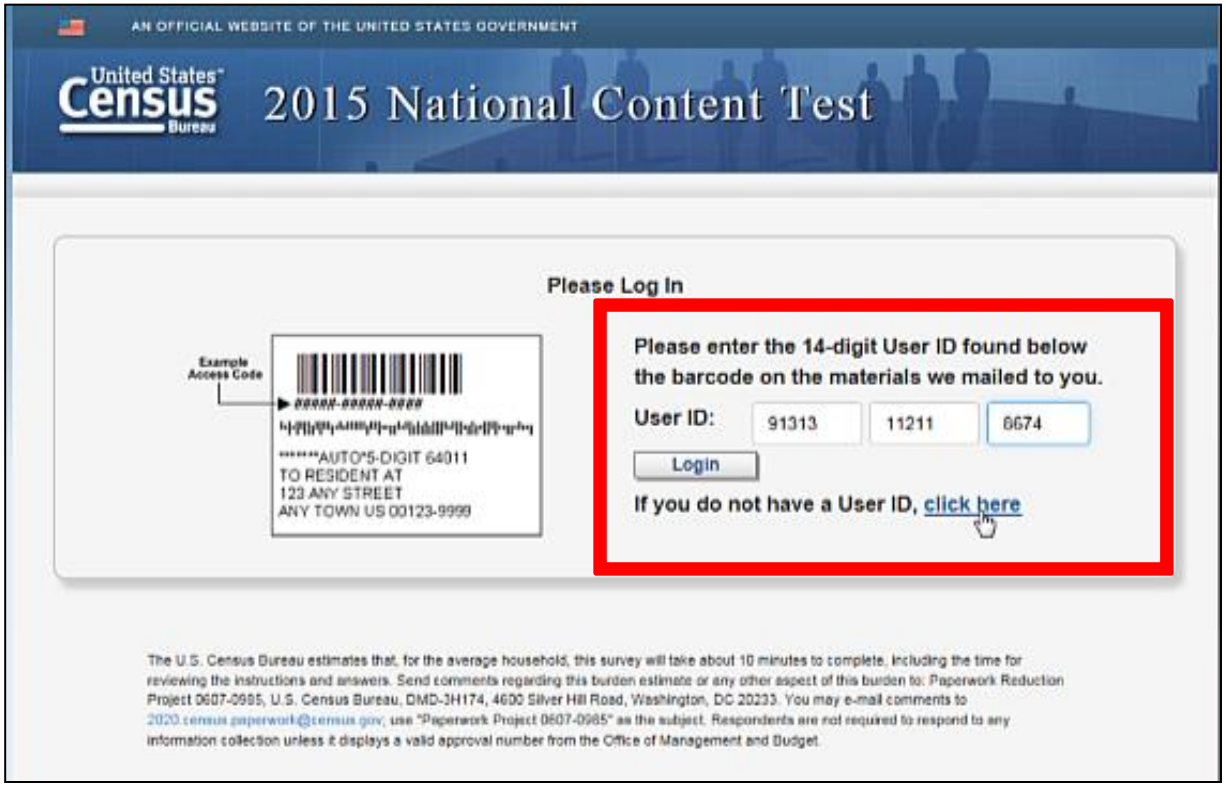
More spacing between response options

Iterative testing

Similar survey, across field periods

- ✓ Household
- ✓ Business

Field period 2015

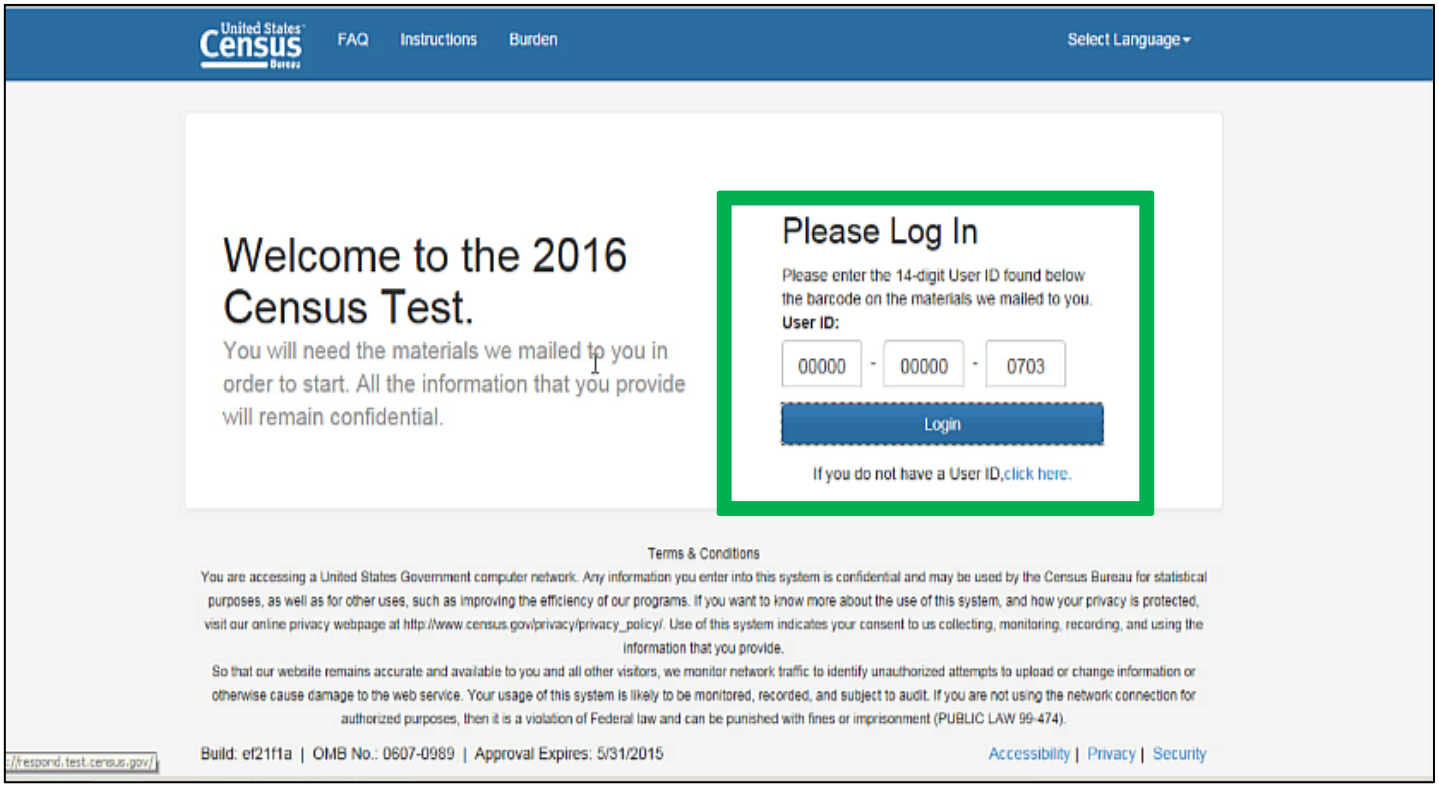


Iterative testing

Similar survey, across field periods

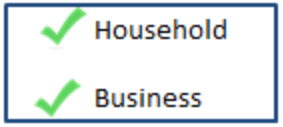
- ✓ Household
- ✓ Business

Field period 2016



Tip 3: Set up the task

- The survey task
  - "Answer the survey questions as they apply to you in real life."
- Dummy data



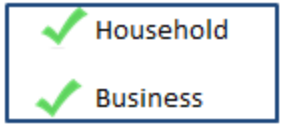
  - Mocked-up mailing materials
  - Pre-filled data
  - Example instruction: "If you were to receive the survey at your home, the mailing materials you would get would have your name. Since we cannot replicate that for the lab setting, you will have to pretend that this letter came to your address and that is your address. That is the only part of the study that is pretend."

Tip 4: Probing

- Think-aloud ✓ Household ✓ Business
  - Think –aloud vs. silence
  - 35 question problems vs 9 over 2 rounds of testing
    Nichols 2016
  - Does not affect eye-tracking data with exception of older users

    Romano Bergstrom and Olmsted-Hawala,2012
- Concurrent probing or verbal probing as described by Willis (2004; 2015) ✓ Business

Tip 5: Think-aloud

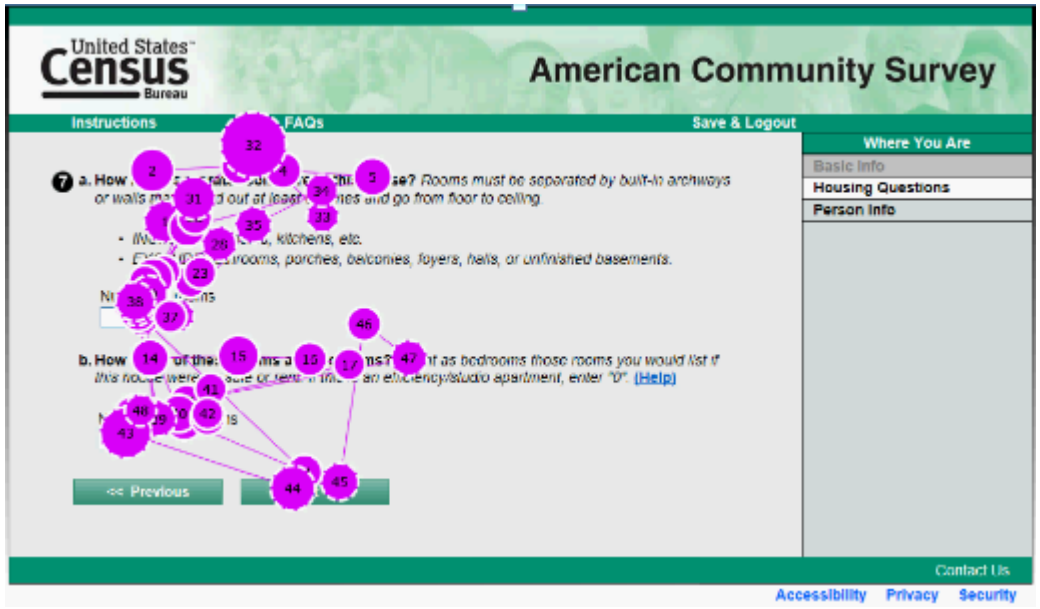


- "How many windows are in your home?"
  - Dillman, 2007; Ericsson and Simon, 1993
- Participants who fall silent
  - "Keep talking" (saying that very quietly)
  - backchannel continuers such as "mm-hm" or "uh-huh"
  - Boren & Ramey, 2000; Ericsson & Simon, 1993; Fox, Ericsson & Best, 2011; Hertzum, Hansen & Anderson, 2009; Nørgaard & Hornbæk, 2006
- Participants who get "stuck" on an issue
  - "We will be sure to tell the developers" or "Thank you, I've made a note of the problem"

Tip 6: Eye-tracking

Household

If there is time to analyze. Much is still unknown.

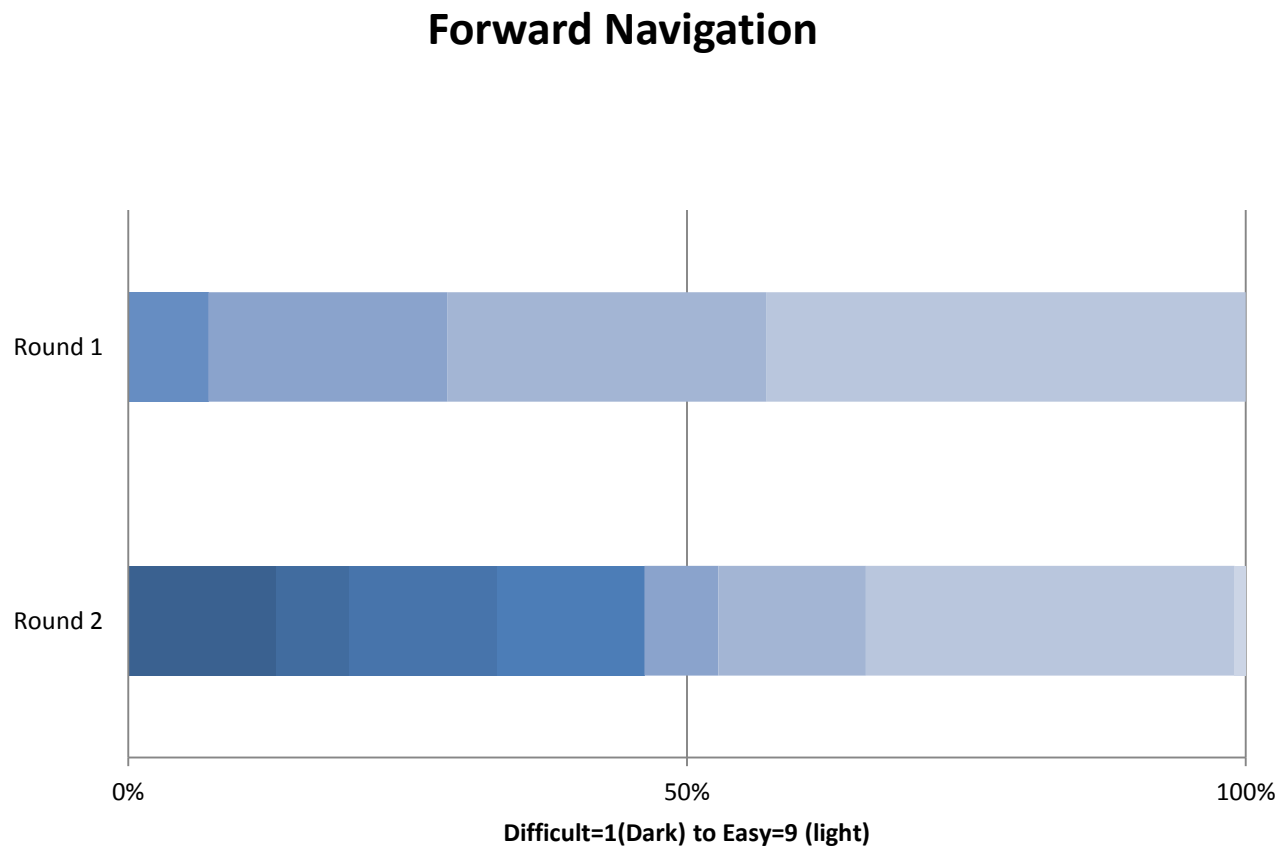


Tip 7: Measuring Satisfaction

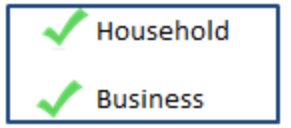
Much is still unknown.

- Questionnaire for User Interaction Satisfaction (QUIS) (Chin, Diehl, & Norman, 1988)
  - Use a modification of these items
- System Usability Scale (SUS) (Brooke, 1996)
  - 10-items – better for website then web survey
- Still in need of a better survey – satisfaction with taking a survey is difficult to measure
- How to present the data

Example of satisfaction scores across 2 rounds



Source: 2015 Census Test Usability Satisfaction Questionnaire



Tip 8: Vignettes

- One way to measure accuracy
- Test rare events
  - For example, a break-off and a resume
  - An edit message

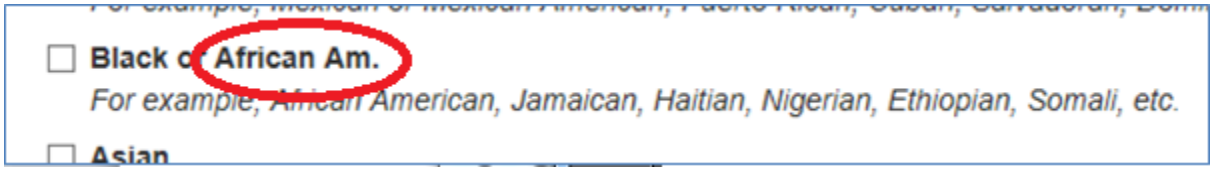
Household

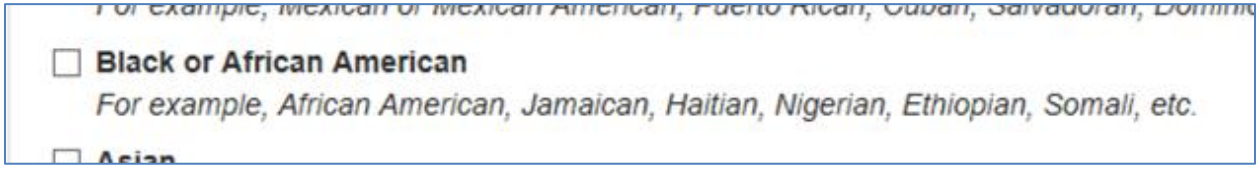
Business

Tip 9: Retrospective Debriefing

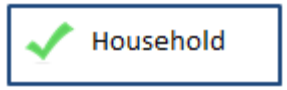
Much is still unknown.

- PowerPoint slide deck to jog memory
- Beware of memory error and retrofitting the problem to something unrelated
- Useful to compare minor changes to design or a before and after





Tip 10: Use pictures to communicate usability issues



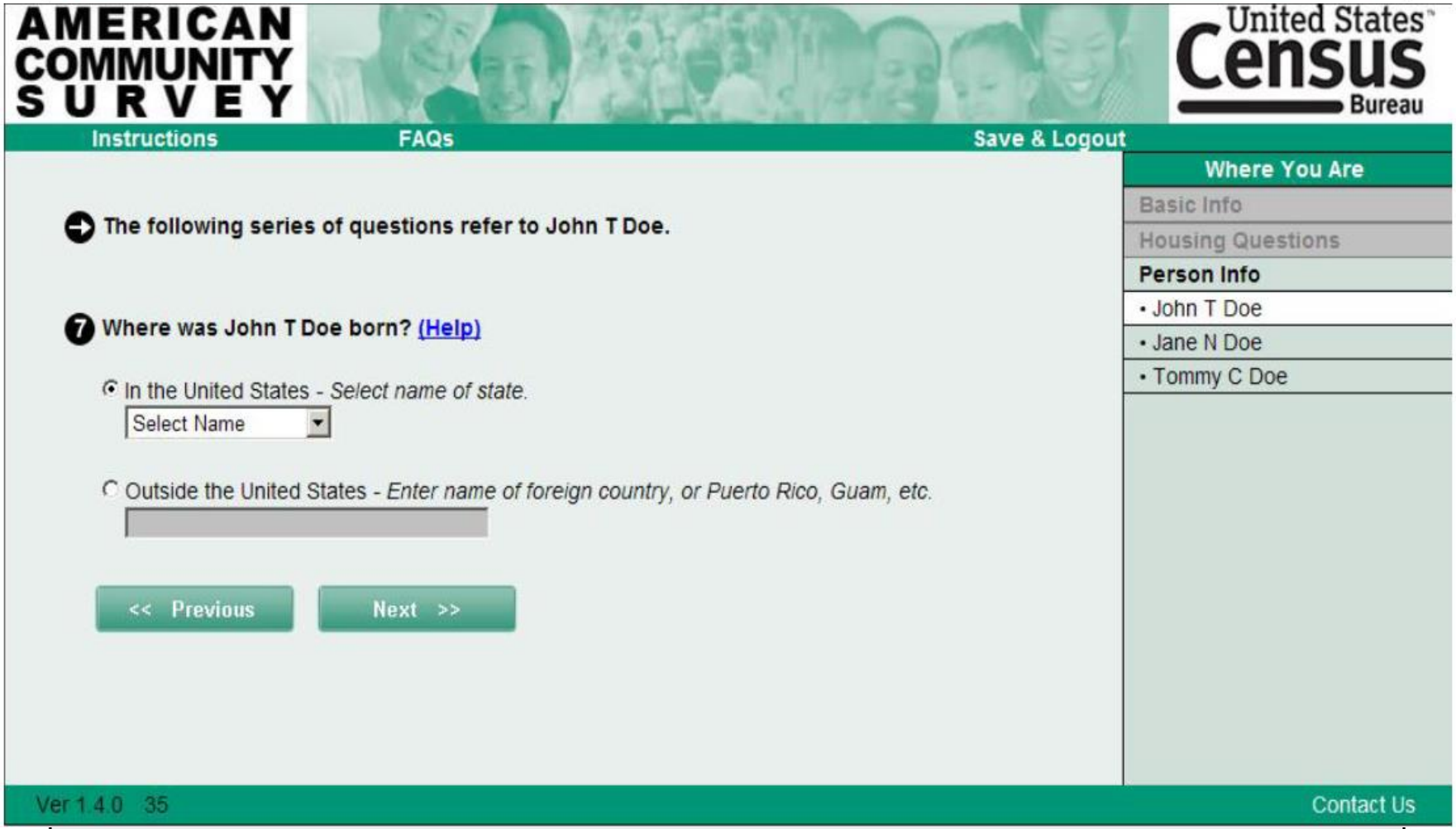
- Review video and notes
- Screen shots and PowerPoint with issues and recommendations
- Shortly after sessions end
- Written report can follow

Success Example
Return on Investment

American Community Survey

2011-2016

2011 – Usability testing



2011 ACS Internet Test

- Paradata
  - This question triggered the most alerts of any screen.
  - ~ 10 % of the people visiting this screen receiving an alert

(Horwitz, Tancreto, Zelenak, and Davis, 2013).

2013– Usability testing, version 1

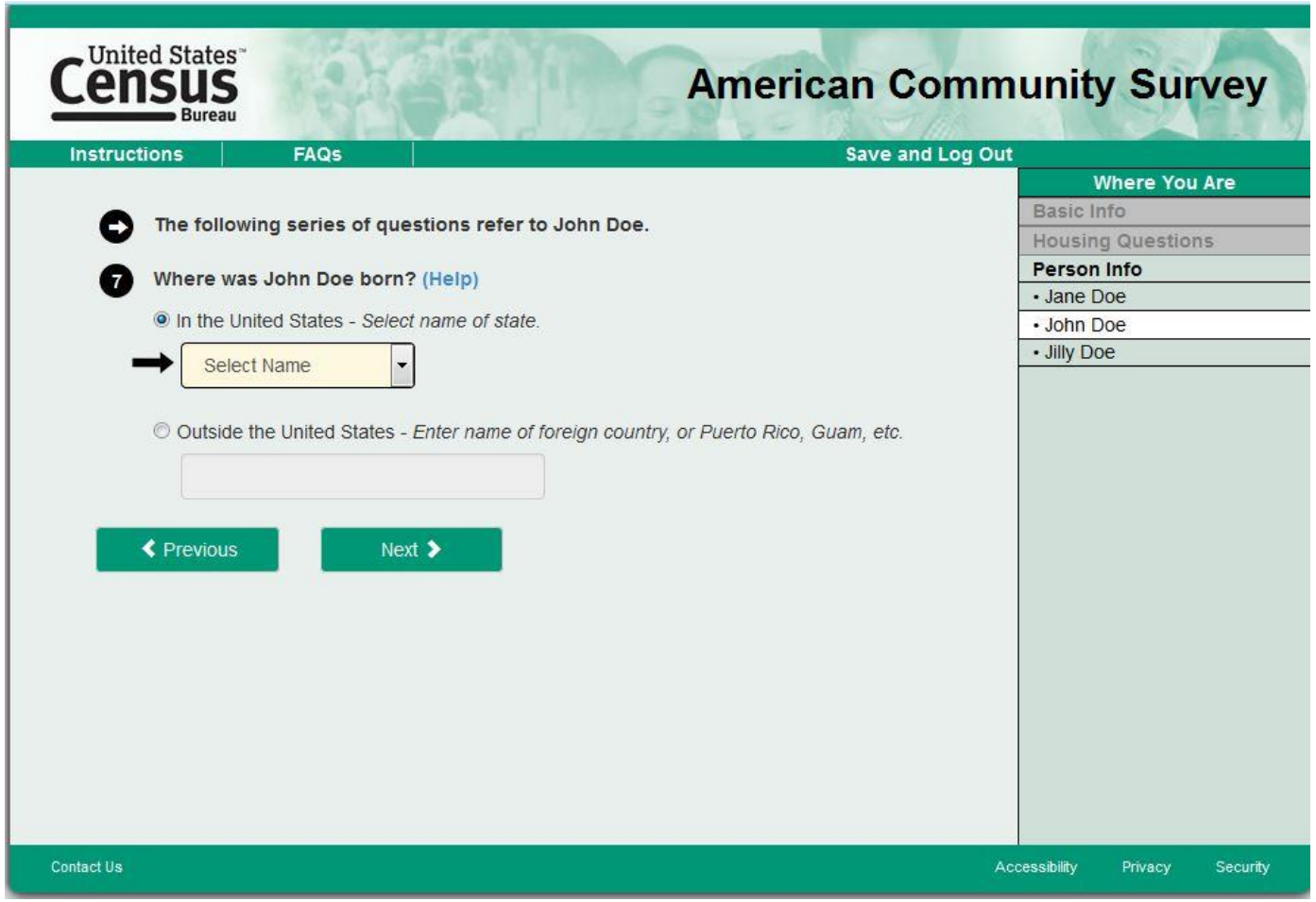
2013 Usability testing, version 2

2014 ACS field test

- Paradata for split-panel test
  - Alerts in new design < Alerts in former design

(Zelenak, 2016)

2016 ACS


United States Census Bureau
American Community Survey
Instructions
FAQs
Save and Log Out
Where You Are
Basic Info
Housing Questions
Person Info
• Jane Doe
• John Doe
• Jilly Doe
The following series of questions refer to John Doe.
7
Where was John Doe born? (Help)
In the United States - Select name of state.
Select Name
Outside the United States - Enter name of foreign country, or Puerto Rico, Guam, etc.
Previous
Next
Contact Us
Accessibility
Privacy
Security

Questions

Elizabeth Nichols

Elizabeth.May.Nichols@census.gov

Erica Olmsted-Hawala

Erica.L.Olmsted.Hawala@census.gov

Temika Holland

Temika.Holland@census.gov

Amy Anderson Riemer

Amy.E.Anderson.Riemer@census.gov

References

- Ashenfelter, K. T., Holland, T., Quach, V., Nichols, E., Lakhe, S. (2012). ACS Internet 2011 Project: Report for Rounds 1 and 2 of ACS Wireframe Usability Testing and Round 1 of ACS Internet Experiment Mailing Materials Cognitive Testing *(Survey Methodology #2012-01)* http://www.census.gov/srd/papers/pdf/ssm2012-01.pdf
- Boren, T., & Ramey, J. (2000). Thinking aloud: Reconciling theory and practice. *IEEE Transactions on Professional Communication*, *43*(3), 261-278.
- Brooke, J. (1996). SUS – A quick and dirty usability scale. Usability Evaluation in Industry. In: P.W. Jordan, B., Thomas, I. McClelland and B.A. Weerdmeester (Eds.), London: Taylor & Francis. Available online at: http://cui.unige.ch/isi/icle-wiki/_media/ipm:test-suschapt.pdf
- Chin, J. P., Diehl, V.A., & Norman, K. L. (1988). Development of an instrument measuring user satisfaction of the human-computer interface. *Proceedings of CHI '88: HumanFactors in Computing Systems* (pp. 213-218). New York: ACM.
- Dillman, D. A. (2007). Mail and internet surveys: The tailored design method (2nd ed.). New York: John Wiley & Sons.
- Ericsson, K. A., & Simon, H. A. (1993). *Protocol Analysis: Using Verbal Reports as Data*. Cambridge, MA: The MIT Press.
- Faulkner, L. (2003). "Beyond the five-user assumption: Benefits of increased sample sizes in usability testing." Behavior Research Methods, Instruments, & Computers (2003) 35: 379. doi:10.3758/BF03195514
- Fox, J. (2001). Usability Methods For Designing A Computer-Assisted Data Collection Instrument for the CPI. Proceedings of the 2001 Federal Committee on Statistical Methodology (FCSM) Research Conference http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.159.4335&rep=rep1&type=pdf Last accessed 8/30/2016.
- Fox, M. C., Ericsson, K. A., & Best, R. (2011). Do procedures for verbal reporting of thinking have to be reactive? A meta-analysis and recommendations for best reporting methods. *Psychological Bulletin*, *137*, 316-344.
- Hertzum, M, Hansen, K., and Anderson, H. (2009). Scrutinising usability evaluation: does thinking aloud affect behaviour and mental workload? *Behaviour & Information Technology* 28 (2), 165-181.
- Horwitz, R., Tancreto, J.G., Zelenak, M.F., Davis, M.C. (2013). Use of Paradata to Assess the Quality and Functionality of the American Community Survey Internet Instrument, Last accessed 8/16/2016 at https://www.census.gov/library/working-papers/2013/acs/2013_Horwitz_01.html
- International Standards of Organization (ISO). (1998). ISO 9241-11:1998 Ergonomic requirements for office work with visual display terminals (VDTs) – Part 11: Guidance on usability. Last accessed 9/7/2016 at http://www.iso.org/iso/catalogue_detail.htm?csnumber=16883
- Nichols, E. (2016) Cognitive Probing Methods in Usability Testing – Pros and Cons Presentation at American Association of Public Opinion Research (AAPOR) annual conference in Austin, Texas, May 15, 2016.
- Nørgaard, M., & Hornbæk, K. (2006). What do usability evaluators do in practice? An explorative study of think-aloud testing. In *Proceedings of the 6th Conference on Designing Interactive Systems*(pp. 209-218).
- Olmsted-Hawala, E., & Holland, T. (2015). Age-related differences in a usability study measuring accuracy, efficiency, and user satisfaction in using smartphones for Census enumeration: Fiction or Reality? In Proceedings from HCII 2015, Lecture Notes in Computer Science, Human Aspects of IT for the Aged Population, Springer.
- Romano Bergstrom, J.,and Olmsted-Hawala, E. (2012). Effects of age and think aloud protocol on eye-tracking data and usability measures, Presentation at International conference EyeTrackUX, Las Vegas, NV, June 2012.
- Tullis, T. (2007). Older adults and the web: Lessons learned from eye-tracking. Universal Access in Human Computer Interaction: Coping with diversity, Volume 4554 of the series Lecture Notes in Computer Science pp 1030-1039
- Willis, G. B. (2015). *Analysis of the cognitive interview in questionnaire design*. Oxford University Press.
- Willis, G.B., (2004). Cognitive Interviewing Revisited: A Useful Technique, in Theory? *Methods for testing and evaluating survey questionnaires*. In S. Presser et al. New Jersey: John Wiley & Sons, Inc. pp 149-172.
- Zaphiris, P and Savitch, N. (2008). Age related differences in browsing the Web. In SPARC Workshop on "Promoting independence through new technology", Reading England UK. Available online at http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.167.7963&rep=rep1&type=pdf
- Zelenak, M.F., (2016) 2014 American Community Survey Internet Test. U.S. Census Bureau: Decennial Statistical Studies Division 2016 American Community Survey Memorandum Series. #ACS16-MP-05.