The Consumer Expenditure Diary Survey (CED)

- Currently, BLS’s only self-administered household survey
- Respondents are asked to enter all of their expenses in as close to real-time as possible
- Respondents complete two, 1-week diaries
As a Web Survey
The CE Diary is Unique

- Respondents access the diary multiple times throughout the diary period
  - Respondents may be more likely to invest time in learning the instrument (e.g., training materials)
  - Usability problems are multiplied across repeated experiences
- Because respondents return to the survey multiple times and need access to data they’ve already entered, a login process is required
As a Password-Protected Website
The CE Diary is Unique

- People volunteer their time and effort for limited personal benefit
- Credentials are only usable for 2 weeks
- Putting roadblocks in their way gives people a reason to say "No" or put in less effort

Discussion Topic

- How do we balance security and usability to ensure that web surveys live up to their promise of making survey response more convenient for respondents, while still keeping their data safe?
Diary Development Timeline

- **2004**: Current Paper Diary First Used in Production
  - First Web Instrument Developed at BLS
- **2005**: Individual Diaries Field Test
- **2011**: Two New Web Instruments Developed at Census
- **2012**: Web Diary Feasibility Test
- **2013**: First Mobile Instrument Developed
- **2014**: Individual Diaries Feasibility Test
- **2015**: Gemini Proof of Concept Test
  - New Web Instrument Developed
- **2016**: Electronic Diary Development Contract
- **2017**: Gemini Large Scale Feasibility Test


- The Paper Diary does not have any built-in security measures

- 21 participants were assigned 10-character account number and password
- They could change password

Usability Recommendations

- “Criteria for creating a password are troublesome”
- “if password criteria are not absolutely required, remove them”
- “Make password & ID easier”

ATTENTION: Password Criteria

- Must be between 8 and 12 characters long
- Must contain 3 of these 4 following options
  - UPPERCASE ALPHA (A-Z)
  - Lowercase alpha (a-z)
  - Numeric (0-9)
  - Special Character !@#$%^_~\"\|\{\}
- Passwords must match
Individual Diaries Field Test (2005)

- 38 participants in 20 households were given the choice of the Paper Diary and the new Web Diary
- Only 2 participants chose the Web Diary
- Several participants cited ease of use as a reason for choosing the Paper over the Web Diary.

![](image)

Second Web Version (2011)

- 42 participants were given an ID Number
- They entered the ID and received an email
- They then set a username and password
Usability Recommendations
Second Web Version (2011)

- 52% of participants failed to create a password on the first try
- 31% commented negatively about the account creation process
- “We recommend implementing a PIN login screen.”

Passwords must contain a minimum of the following:
- 8 characters in length
- 1 uppercase character
- 1 lowercase character
- 1 number
- 1 special character from the following: ! # $ * & ? ~

Third Web Version (2011)

- 22 participants were assigned a username and 6-digit PIN as a password
- They were not allowed to change their PIN/password
Usability Recommendations
Third Web Version (2011)

- All participants completed a successful log-in using only 1 attempt

Web Diary Feasibility Test (2013)

- 1,426 respondents were asked to record their expenses using the Web Diary

<table>
<thead>
<tr>
<th></th>
<th>Web (N = 890)</th>
<th>Paper (N = 2,522)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response Rate</td>
<td>32%</td>
<td>61%</td>
</tr>
<tr>
<td>Total Recall Rate</td>
<td>21%</td>
<td>9%</td>
</tr>
<tr>
<td>Week 1: # of Diary Entries</td>
<td>38</td>
<td>42</td>
</tr>
<tr>
<td>Week 2: # of Diary Entries</td>
<td>32</td>
<td>38</td>
</tr>
<tr>
<td>Total: # of Diary Entries</td>
<td>70</td>
<td>80</td>
</tr>
</tbody>
</table>
### Web Diary Feasibility Test (2013)

#### Demographics

<table>
<thead>
<tr>
<th>Category</th>
<th>Web</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Age</strong></td>
<td>50.1</td>
<td>49.6</td>
</tr>
<tr>
<td><strong>Average CU Size</strong></td>
<td>2.6</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Ethnicity (Hispanic)</strong></td>
<td>12.7%</td>
<td>9.8%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>48.5%</td>
<td>51.0%</td>
</tr>
<tr>
<td>Female</td>
<td>51.5%</td>
<td>49.0%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elementary</td>
<td>0.9%</td>
<td>1.4%</td>
</tr>
<tr>
<td>High School</td>
<td>21.1%</td>
<td>26.7%</td>
</tr>
<tr>
<td>College</td>
<td>78.1%</td>
<td>71.8%</td>
</tr>
<tr>
<td>Never Attended</td>
<td>0.0%</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

#### Login Difficulty

- How easy or difficult was it to log in?

<table>
<thead>
<tr>
<th>Difficulty</th>
<th>Percent (n= 296)</th>
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</thead>
<tbody>
<tr>
<td>Very Easy</td>
<td>38.5%</td>
</tr>
<tr>
<td>Easy</td>
<td>28.0%</td>
</tr>
<tr>
<td>Neither Easy nor Difficult</td>
<td>13.2%</td>
</tr>
<tr>
<td>Difficult</td>
<td>8.1%</td>
</tr>
<tr>
<td>Very Difficult</td>
<td>12.2%</td>
</tr>
</tbody>
</table>
Web Diary Feasibility Test (2013)

- % of Respondents Who Reached the Login Screen

First Mobile Version (2013)

- 29 participants assigned 8-digit User ID and 8 character password
- They could change their password
- Respondents do not enter a household roster (i.e., there is no longer PII stored in the Diary)
Usability Recommendations
First Mobile Version (2013)

- Nearly half of participants had trouble logging in with the provided password
- Only 1/3 of participants were able to successfully change their password without assistance
- “Simplify the password”
- “Limit the use of characters that look alike (e.g., 1, l, I, !)”

Passwords must contain a minimum of the following:
- 8 characters in length
- 1 uppercase character
- 1 lowercase character
- 1 number
- 1 special character from the following: ! # $ * & ? ~

Your Password
ceG6szP*

15 keys for an 8 character password!
Individual Diaries Feasibility Test (2014)

- 1,553 households were given the choice of using the Web or Mobile version.

<table>
<thead>
<tr>
<th></th>
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<th>Mobile</th>
<th>Paper</th>
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<tr>
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% of Respondents Who Reached the Login Screen By Mode

Graph showing the percentage of respondents who reached the login screen by mode (Mobile and Web) over the days in the diary period. The graph indicates a higher percentage for Web compared to Mobile, especially in the second week.
Individual Diaries Feasibility Test (2014)

- % of Respondents Who Reached the Login Failure Screen By Mode

<table>
<thead>
<tr>
<th>Days in Diary Period</th>
<th>Week 1</th>
<th>Week 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mobile</td>
<td>Web</td>
</tr>
<tr>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7-Digit PIN Test (2015)

- 8 participants were assigned 7-Digit PIN
- They can change their PIN within limits (cannot use patterns 1212121)
Usability Recommendations

7-Digit PIN Test (2015)

- Participants preferred password over PIN
- Needs further study, especially on Mobile
- Continue with current password requirements

Passwords must contain a minimum of the following:
- 8 characters in length
- 1 uppercase character
- 1 lowercase character
- 1 number
- 1 special character from the following: ! # $ * & ? ~

Current Web and Mobile Versions (2015)

- Respondents assigned a username and password
- They can change their username and/or password
Risk Management vs. Risk Elimination

- Organizations use risk assessments to determine authentication needs and consider...security in balancing the need to ensure ease of use for access to federal...information systems with the need to protect and adequately mitigate risk. -NIST 800-53, Rev 4, IA-8

<table>
<thead>
<tr>
<th>Impact</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Mod.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Low</td>
<td>Mod.</td>
<td>High</td>
</tr>
<tr>
<td>High</td>
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Discussion Topic

- How do we balance security and usability to ensure that web surveys live up to their promise of making survey response more convenient for respondents, while still keeping their data safe?
Contact Information

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