Cognitive Testing and the Census Bureau Poverty Website: Improving Usability Under Multiple Constraints

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Executive Summary

The Census Bureau's poverty website has frequently presented data in ways that are not always intuitive to the user. One aspect of improving the website involves bringing the website's presentation of the data in line with users' expectations and understanding. Four design goals in particular need to be met: *accuracy*—getting the correct data to the user for his or her purposes, without compromising the Census Bureau's standards for data dissemination; *consistency*—maintaining a similar look-and-feel across web pages belonging to different subject areas within the Census Bureau, so that users would not need to learn another navigation scheme for different subject areas; *efficiency*—minimizing the number of mouse clicks required of a user to find his or her data; and *intuitiveness*—displaying terms, links, and data in a way that the user can understand.

Even though usability guidelines abound for addressing each of these goals individually, these four goals often compete with one another because Census Bureau poverty data were not collected and tabulated to meet all users' needs simultaneously. Namely, the estimates are often not available with the kind of detail a user may want; or if the data are available, they may be from different surveys and therefore not readily comparable in the way the user expects; or they may require more caution and understanding than the user anticipates. The Census Bureau desires not just to make its data easy to find, but also to help its customers use the data properly. Hence, all four usability goals must be met.

Between 2001 and 2004, a website design team in the Census Bureau’s Housing and Household Economic Statistics Division (HHES) developed poverty website prototypes to better meet all four usability goals. Because usability literature available to the team said more about meeting individual goals than about balancing multiple goals, the design team used cognitive testing to guide their prototype designs. In cognitive testing, volunteer participants, who represented potential website users, used the prototypes to answer a set of test questions about poverty data. The test administrator asked the

participants to say what they were thinking as they navigated through the prototype, so that the design team could learn whether or not the participants understood the prototype's features. This feedback helped the team to fix problems in the prototypes and to evaluate how well their designs balanced the four goals. Thus, through a series of cognitive tests, the team learned how better to reconcile the four competing goals, in ways that were not immediately apparent from the usability literature, and in turn developed a better poverty website.

Three usability studies were conducted on the poverty website, with each study building upon the results of the previous studies. Results of the most recent (2003) study indicated that novice users (people who were unfamiliar with Census Bureau data) were better able to use the 2003 prototypes than the existing poverty website, that novice users nonetheless had difficulty finding the correct answers to questions about poverty, and that roughly half of their incorrect answers did not result from an inability to find the correct table but rather that users had trouble finding the answer once the correct table was in front of them. Since reformatting the poverty tables was out of scope for this study, the reasons for the novices' failures were encouraging to the team, in that the prototypes used a better navigation scheme than the existing poverty website, and that future improvements to the online tables would likely help novice users. Expert users (those familiar with Census Bureau data) found the correct answers 76 to 81 percent of the time—much more frequently than novices (whose success rates ranged from 20 to 27 percent). In summary, the four goals were better met because the team conducted a series of cognitive tests and the lessons learned from the 2003 test were used to develop a new prototype for a future poverty website.

I. Introduction

In 2001, a usability study was conducted on the existing poverty website. Results indicated that the website needed improvement as only 32 percent of individuals able to find the correct answer. By understanding what a usable website entails, how users behave on the Internet, and what good usability practices are, a website redesign team was formed to address the usability issues surrounding the poverty website. Examination of the website and the data it housed, resulted in discovering usability issues as a result of the poverty data in addition to the lack of a navigational mechanism.

Four goals were set after the 2001 study that would guide the website redesign team in combating the usability issues which were present. Iterative testing was utilized in order to confirm or deny the website redesign team's hypotheses on how to resolve the four goals. A prototype was designed and tested in the 2002 usability study. The 2002 study confirmed that the website redesign team's hypotheses helped to solve each goal individually; however, collectively, the solutions did not work because as one problem was resolved, another problem arose. From the 2002 study, proposed solutions to resolve the conflicts led to two prototypes for further testing. The implementation of the proposed solutions resulted in the 2003 study, the last study conducted on the poverty website. The results would indicate whether the proposed solutions resulted in optimal outcomes, and how this would affect a future version of the poverty website.

This paper presents the results of the three usability studies conducted. The next section presents background information on developing good websites. It continues with a discussion of the three Census Bureau studies of the poverty website and prototype development, followed by a conclusion section and a discussion of future research.

II. Background

Businesses, government and non-profit organizations rely on their websites as a way to make information easily accessible to the public. Unfortunately, a recent study found that many of these websites are poorly designed. The Experience Design Group of Andersen's Office of Government Services tested 25 federal websites and found that 80 percent of websites scored poorly on navigational consistency and 60 percent of the websites did not organize their content with the user in mind.[2] Designing an effective website involves understanding how users look for and interpret information on the Internet as well as having an understanding about the nature of the data provided.[3]

a. What is usability?

The International Standards Organization (ISO) has formally defined usability as the way users "achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."[4] With the introduction of computers and the advent of the World Wide Web (WWW), usability has expanded to include the Internet. The cognitive process underlying human actions with the Internet have been studied and documented extensively by noted usability experts such as Jakob Nielsen. Nielsen has identified five measures of a usable website: (1) easy to learn, (2) efficient to use (3) memorable, (4) causes few errors, and (5) pleasant to use.[5]

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[2]"A Usability Analysis of Selected Federal Government Web Sites." Andersen Office of Government Services Experience Design Group. February 2002. http://www.aboutweb.org/file/andersen_usb1.pdf
[3] http://usability.gov/pdfs/chapter1.pdf 1:5 Understand and Meet Users Expectations. (Last accessed 19 July 2004).
[4] http://www.iso.org (1998). ISO 9241/11 - Ergonomic requirements for office work with visual display terminals (VDTs) -- Part 11: Guidance on usability. Geneva: International Organization for Standardization.
[5] Nielsen, Jakob. The Art of Navigating Through Hypertext. Communications of the ACM 33. 3 (1990) 296-310

Because those five measures were broadly defined, the website redesign team interpreted them for the poverty website as follows:

(1) Easy to learn – displaying terms, links, and data in a way that the user can understand.

(2) Efficient to use – minimizing the number of mouse clicks required of a user to find his or her data.

(3) Memorable – maintaining a similar look-and-feel across web pages belonging to different subject areas within the Census Bureau, so that users would not need to learn a different navigation scheme for other topics.

(4) Causes few errors – getting the correct data to the user for his or her purposes, without compromising the Census Bureau's dissemination standards, and

(5) Pleasant to use – a high degree of user satisfaction.

Because the redesign team's aim was to improve the poverty website, they translated the first four measures into usability goals. Respectively, they were called intuitiveness, efficiency, consistency, and accuracy. The team expected that the last of Nielsen's measures, user satisfaction, would result from meeting the previous four goals and would be evaluated through participants' comments, non-verbal reactions to website prototypes, and satisfaction questionnaire scores

b. User Behavior

Observations of users' interactions with the Internet indicate that they have a low tolerance for poorly designed websites. Users must juggle multiple tasks when navigating a website. Users scan webpages while simultaneously attempting to figure out how the website is organized in order to find the information they need. If a user cannot comprehend immediately how the website functions, they will likely leave.[6] Internet users look for and digest online information in several ways that distinguish the

[6] Nielsen, Jakob. Usability Basics. http://www.usability.gov/basics/index.html (last accessed 9 July 2004). However, according to Steve Krug (*Don't Make Me Think: A Common Sense Approach to Web Usability*, New Riders, 2000), "[m]any

Internet from print media. Print design is based on letting the eyes search for information, by "selectively looking at information objects and using spatial juxtaposition to make page elements enhance and explain each other." On the other hand, Internet users let the hands search for information through scrolling or clicking. Thus "information relationships are expressed temporally as part of an interaction and user movement."[7]

More than three-fourths of users scan web pages instead of reading every word because reading from a computer screen is 25 percent slower than from paper.[8] As users scan, they look for information that matches their specific interests. The other information on the website receives little or none of the user's attention. Internet users are more impatient online and are motivated to move on. By giving Internet users the ability to scan gives them empowerment and control to read what they want and ignore what they do not need.[9]

The way users scan text information online has been described as the "paradox of the active user."[10] Users search for keywords related to their questions. As a result, they often miss useful information because they either did not recognize it as related to their question or because they had not read through all the information on the webpage thoroughly. Ironically, if users spent more time thoroughly reading instead of scanning, they would likely have a better understanding of what the website has to offer and this would be more efficient in the long run.[11]

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people who encounter a problem with a site tend to blame themselves and not the site.... The prospect of starting over isn't always that attractive" (pp. 18-19), although Krug does emphasize that an effective site saves the user time and accommodates the way users scan for information online (pp. 19-25).

[7] Nielsen, Jakob. Differences Between Print Design and Web Design. Alertbox. 24 January 1999. http://www.useit.com/alertbox/990124.html (last accessed 11 August 2004).

[8] Nielson, Jakob, *PJ* Schemenaur, and Jonathan Fox. http://www.sun.com/980713/webwriting/ . Last accessed 9 July 2004.

[9] Nielsen, Jakob. Why Web Users Scan Instead of Read. Alertbox. Oct. 1997 Presentation. http://www.useit.com/alertbox/whyscanning.html Last accessed 17 June 2004.

[10] Carroll, J.M. and Rosson, M.B. (1987). The paradox of the active user. In J.M. Carroll (Ed.), *Interfacing Thought: Cognitive Aspects of Human-Computer Interaction*. Cambridge, MA: MIT Press

[11] Nielsen, Jakob. The Paradox of the Active User. Oct. 1998 Personalization. http://www.useit.com/alertbox/activeuserparadox.html. Last accessed 17 June 2004.

While a user might find relevant information by carefully reading through all the material presented on a particular website, the user has no guarantee up front that a particular website will provide the information he or she wants. If the website does not have what the user wants, then the user will have wasted time reading the website thoroughly.[12] Hence, rather than wading through all the information presented on the website, users seek to control their search by scanning for clues that the website will provide a payoff to their reading efforts, staying if the website gives them sufficient feedback that it will have what they want, and leaving if they do not get such feedback.

c. Good Usability Practices

Before beginning the design process and evaluation, it is important to follow several guidelines. Goals should be identified before the design process begins. Prototypes should be tested often. Most problems will surface in the first study of a website, however, iterative testing will help determine if the fixes implemented are working and if other problems exist. Thus, instead of placing all of the design team's time and effort into one usability study, the HHES web redesign team conducted three tests on the poverty website, plus several studies on the Census Bureau disability website (See Appendix C for a timeline of the progression of usability studies).

To measure progress, before and after studies should be conducted to evaluate whether changes made a difference in the usability of the website. Even though the redesign team learned how to conduct more focused usability tests over the course of the project (and thus the results from each test were not directly comparable in a statistical sense), the design team did compare the qualitative results of the 2001 study with the 2003 study.

[12] Nielsen, Jakob. Information Foraging: Why Google Makes People Leave Your Site Faster. Alertbox. 30 June 2003. http://www.useit.com/alterbox/20030630. Last accessed 22 June 2004.

These guidelines were used in the redesign of the poverty website to help the team design prototypes and evaluate whether they met the four main goals of the study.

d. Usability Issues with Poverty data on the Census Bureau Poverty Website

The Census Bureau provides poverty data in the form of tables or in reports from four different surveys. This affects users of poverty data in three ways: 1) the vast number of tables available for poverty data even from a single survey can make it difficult for a user to find the data he or she needs; 2) not every characteristic, geography, or time period is available from all of the surveys; and 3) even when different surveys provide data for (seemingly) the same characteristic, geographic area, and time, the data may not be the same across surveys. Depending on how familiar users are with using poverty data, they may be left wondering which number best fits their purposes, or which number is more "accurate." This may cause a user to lose confidence in the Census Bureau's ability to provide helpful information.

Tables 1 and 2 provide information about the purposes for each of the surveys, the ways users can get confused by the existence of multiple surveys, and potential sources of confusion that are common to data from all the surveys. Table 1 illustrates the differences between surveys. These differences explain why a poverty rate or number for the same time period, geography, or characteristic might differ across surveys.

Table 1. Differences Among the Four Main Surveys That Collect Poverty Data				
	Survey			
	American Community Survey (ACS) (2000-Present)	**Current Population Survey (CPS) (1959-Present)**	**Decennial Census (1970-2000) Long Form**	**Survey of Income and Program Participation (SIPP) (1984-Present)**
What is it?	Will replace the decennial census long-form (pending funds from Congress) to provide small area estimates on a yearly basis.	Obtains detailed labor force data and is the source for official annual estimates of poverty	Provides data on various demographic, economic and social characteristics	Obtains detailed income data and follows a cohort of individuals for 3 to 4 years
Level of Geographic Detail	Currently for geographic areas of 250,000 people or more. By 2010, for geographic areas as small as census tracts using multi-year averages.	National estimates and some state-level estimates using multi-year averages.	Geographic areas as small as census tracts.	National estimates only. Starting in 2004, state-based sample will allow selected state estimates.
How often are Data Released?	Annually	Annually	Every 10 years. Will be replaced by ACS (pending funds from Congress).	Varies
How Income Questions are Phrased?	Income in past 12 months (collected monthly).	Income in last calendar year	Income in last calendar year	Income in last four months (collected three times a year).
Detail of Income Questions:	Write-in boxes for eight subcategories of income, plus a separate question verifying total income	18 subcategories of income, plus verification of total income	Write-in boxes for eight subcategories of income, plus a separate question verifying total income	About 44 subcategories of income.
How are Data Collected?	Mail-back form, followed by telephone interview from a centralized facility, and lastly by personal interview of a roughly 1-in-3 sample of nonrespondents, conducted by highly trained field representatives.	Personal or telephone interview by a highly trained field representative.	Mail-back form, followed by personal interview of nonrespondents by a trained field representative.	Personal or telephone interview by a highly trained field representative.

Differences between surveys affect the kind of poverty data available. The following example illustrates how a disagreement between two surveys' numbers could confuse a user. The Current Population Survey (CPS) in 2002 estimated the national poverty rate to be 12.1 percent, while the American Community Survey (ACS) estimated it to be 12.4 percent. These differences in rates are a result of differences

described in the last three rows of Table 1, however, if a user is not aware of the differences, he or she may wonder which number to use.

In addition, since poverty data are not available for every characteristic, geography, or time period, users must search through each survey to find the desired combinations of characteristics. Since there is no way to see what is not available, a user could be searching for something that does not exist. For example, the Survey of Income and Program Participation (SIPP) is currently only available for select states, but sifting through the existing Poverty website, nowhere are the select states explicitly stated.

Survey differences account for one of the many problems users encounter when they search for poverty data. However, cognitive testing brought to light other problems users encounter and how they affect the users. Table 2 illustrates these problems.

Table 2. Problems Common to Poverty Data		
Problem	**How it Affects the User**	**Examples**
Poverty data available in many formats with the majority as tables, not associated with a report, in a "table package" - a collection of tables	When users understand the order of tables on a web page, they can scan and find the data they need. When tables within a table package are not ordered in a way that is obvious to users, they cannot quickly locate data.	See Appendix B.2
Tables with many characteristics	Users have difficulty finding the information they need within a table, as well as distinguishing the characteristic they want from a list of tables.	See Appendix B.2
Numbers may be displayed in thousands instead of individual units of people or families	Confusing to a user who cannot see the headnote "(Numbers in Thousands)"	Table Title (Numbers in Thousands) Total People in US. . . . 285,317 when estimate is 285,317,000
Characteristics are broken down into sub-categories	Users who may want Poverty data by gender will be faced with hundreds of tables with numerous other combinations	Tables on Individuals are further broken down by gender, by ratio of income to poverty, etc.
Technical descriptions or Census Bureau jargon	Users may get confused or frustrated	Ratio of Income to Poverty Below 100% of Poverty

III. Previous usability studies of the Census Bureau poverty website

No one purposefully creates a hard-to-use website. For the Census Bureau poverty website, difficulty in using the website represents competing goals that need to be resolved. A 2001 usability study conducted on the existing version led the redesign team to develop a prototype (called the "matrix") that was tested in 2002 (see Appendices A.3 through A.5). Although the "matrix" prototype attempted to achieve the four goals of accuracy, consistency, efficiency, and intuitiveness, the test results were somewhat disappointing yet instructive. Based on the feedback from the 2002 study, a 2003 study used two new prototypes that yielded better results.

This section describes the usability studies conducted on the poverty website in 2001 and 2002, what was learned from them, and how those results helped the redesign team develop the 2003 website prototypes.

a. 2001 study

In 2001, a study of the existing poverty website (see Appendix A.1) and an initial prototype tested the usability of the websites by assessing achievement in three areas: obtaining a correct answer to each test tasks, time spent on each task, and user satisfaction. The results indicated that only 32 percent of all users were able to find correct answers to questions, and of those successes, 78 percent found the answer within 5 minutes. Furthermore, both novice and expert users had difficulty using the website—the success rate for novice users was 15 percent; for experts, 40 percent. User satisfaction, measured from a post-study questionnaire (see Appendix B.8) and verbal comments was neutral; the mean satisfaction score was 3 on a scale of 1 to 5 (with 1 being completely dissatisfied and 5 being completely satisfied). The main problem was that users had no idea what to expect behind the links.

The 2001 study demonstrated that the poverty website needed improvement. Designing a better website meant applying good usability practices (see section II c) and emphasizing the subject topics of the data over the survey from which they came. Concurrently, several additional requirements had to be met. Different surveys do indeed serve different purposes (see table 1), and as the nation's premier data provider, the Census Bureau is obligated to help users understand the data well enough so that they can use it properly. Because the Census Bureau provides large volumes of detailed poverty data, it was not immediately apparent how to get a data user efficiently to a specific piece of information without a frustrating number of mouse clicks. In addition, any design had to be robust enough so that Census Bureau subject areas other than poverty—whose data might be collected, presented, and used in a different manner than poverty data—could nonetheless use the same design template.

To design a new website prototype that simultaneously met Nielsen's usability recommendations and upheld the Census Bureau's standards as a data provider, the redesign team identified four usability goals. These were *accuracy*—directing users to the data that best fit their needs, in a way that does not misrepresent the quality of the data, and that fulfills the Census Bureau's legal and ethical requirements as a provider of official data; *consistency*—maintaining a similar look-and-feel across web pages belonging to different subject areas within the Census Bureau, to help the user more easily navigate other websites without having to learn a new navigation scheme; *efficiency*—providing data to the user in as few clicks as possible; and *intuitiveness*—displaying terms, links, and data in a way that the users can understand their meanings. While each goal helps a website be more usable, the goals sometimes compete with each other (see Table 3).

Table 3. How the Goals Compete With One Another		
Competing goals	**Situation described**	**Example**
Accuracy vs. Consistency	Different subject areas have data that are collected differently and are used for different purposes, thus the choices of links offered to a user may vary significantly across subject areas. "Accuracy" entails getting the appropriate data for the user's purpose, but which data are appropriate may vary across subject matters (possibly violating "consistency").	Poverty is defined according to a statistical policy directive and large table packages are produced annually. In contrast with poverty, "disability" has no standard definition, and fewer disability tables are produced on a regular basis.
Accuracy vs. Efficiency	When large volumes of data are presented, more sub-menus are required to narrow down the user's search. "Efficiency" entails providing data to the user in a small number of mouse clicks, but the more detailed characteristics a user wants, the more links have to be offered in order to get the user those exact characteristics ("accuracy"). Users frequently expect the Census Bureau to provide detailed poverty data.	User 1 needs: Number of African-American female householders with children below 185 percent of the poverty level. User 2 needs: Number of white married-couple families with children below 150 percent of the poverty level. The site must show a large number of combinations to be accessed quickly.
Accuracy vs. Intuitiveness	The Census Bureau may produce data appropriate for a user's purpose (accuracy) but there may be technical reasons why the data are not labeled the way the user expects (intuitiveness). These reasons include: 1) simple concepts sometimes become complicated when the Census Bureau attempts to quantify them 2) the Census Bureau required to use some terms and not others 3) a "simple" answer may not exist for a user's question	1) Many people consider a "child" to be anyone under age 18, but some analysts need to exclude householders or spouses under age 18--thus warranting a new term ("related child") and others define children to be under 19 or under 21. 2) "Hispanic origin" is considered to be an ethnicity, but not a race. Users, however, may expect to find "Hispanic" as a race category. 3) A user may search for the "poverty line," but there are really 48 dollar amounts used to determine poverty status--not one. A usable site must nonetheless accommodate users' expectations.
Consistency vs. Efficiency	Some subject areas produce more data than others, and the data may be collected, categorized, and used differently across subject areas--thus, one subject area may need more links, or a different organization of links, on its main page than another subject area (violating consistency) in order to get a user to the data in an equal number of clicks (efficiency).	Disability tables often have many characteristics appearing in the same table, whereas poverty tables are more varied in the characteristics shown in the table. Therefore poverty would benefit from more characteristic links than disability
Consistency vs. Intuitiveness	Consistency generally makes a site more intuitive to the user, so that the user does not have to relearn a navigation scheme on each site. However, websites must vary across subject areas slightly, to accommodate differences in how the data are used.	Poverty thresholds (dollar amounts used to determine poverty status) are important for understanding poverty data, but a site for disability would need to highlight the existence of different definitions with comparable prominence (for instance, as used in the Americans with Disabilities Act).
Efficiency vs. Intuitiveness	Data are sometimes inherently complicated. It may be easy to get a user to data in a small number of clicks (efficiency), but in order for the user to understand the information once he or she is there (intuitiveness), further information must be offered.	The Current Population Survey (CPS) is the official source of the national poverty rate. Data could be provided in few clicks if CPS data, and no other data, were on the main page. However, CPS does not offer detailed data below the state level. Local-level poverty data would require a link to another survey that is not comparable with CPS.

b. 2002 study

In order to address the problems found in the 2001 study and strike a better balance among the four goals, the design team came up with the concept of a matrix (see Appendix A.4). The matrix was intended to prevent users from mixing up data from different surveys and to make users aware that different data serve different purposes (see Table 1 for descriptions of the four surveys), but the matrix was not intuitive to most users.

The 2002 website prototype offered a user the option of searching for poverty data by characteristic, geography, year, or survey (See Appendix A.3). After selecting an option, a user would see the matrix (see Appendix A.4). In the cells of the matrix were either the words "not available" when there were no tables for that particular characteristic from that particular survey, or the words “Choose Tables,” which was a link to a list of tables available for that characteristic, from that survey. This arrangement allowed users to go to one place to find the information they needed as well as see immediately what was and was not available. Using the evidence that experts are more survey-oriented and novices more characteristic-oriented (based on phone calls and e-mails users made to Census Bureau staff, as data requests), the matrix attempted to serve the needs of both user types.

Table 3 displayed the competing goals and their descriptions and Table 4 presents the solutions to the competing goals implemented in the 2002 study and the study outcome.

Table 4. Competing Goals in the 2002 Study, Proposed Solution, and Outcome		
Competing goals	**Proposed solution in 2002 prototype**	**Did it work?**
Accuracy vs. Consistency	In the matrix of characteristics by survey/geography, different subject areas could have substituted their own characteristics and surveys (accuracy) while maintaining a similar look and feel (consistency).	**Yes**--a matrix for disability was created for a separate test
Accuracy vs. Efficiency	In the matrix, a large number of links appeared on the screen, thereby reducing the number of tables behind any single link, and the number of clicks required to get to any single table (efficiency). In the list of tables behind each link, the "what's in the table" column enabled the user to find detailed combinations of characteristics (accuracy) -- See appendix B.5	**Yes**--poverty rates for detailed groups were accessible within three clicks from the matrix page
Accuracy vs. Intuitiveness	The matrix cells stated when a characteristic was not available for a particular survey or geography. Links to characteristics' definitions or survey were provided in links in the column headings, in an attempt to allow the user to find detailed metadata at the time they would need it, as opposed to forcing the user to read detailed metadata before conducting a search. In the "what's in the table" column in each list of tables, characteristics were paraphrased into plain language as much as possible (intuitiveness).	**No**--despite the bullets at the top of the matrix, users did not know which cell of the matrix to click. When they did obtain a list of tables, however, they could see what was in each table--they just expected to see a single data table instead of having to choose from a list.
Consistency vs. Efficiency	The poverty subject area produces a large volume of tables, and used a 60-cell matrix to find a table in three clicks (efficiency). Subject areas that do not produce data as voluminously could use fewer cells--possibly with better results (consistency).	**Yes**--a matrix for disability was created for a separate test, with fewer cells.
Consistency vs. Intuitiveness	Most subject areas use multiple surveys, and provide data for multiple characteristics (consistency). The matrix was arranged such that the least intuitive element, the surveys, appeared at the top, in scannable bullets.	**No**--test participants did not see the bullets at the top of the matrix (intuitiveness) even though other subjects could be put in the matrix format (consistency).
Efficiency vs. Intuitiveness	The large number of links ensured that any table could be found within three clicks (efficiency). The two dimensional layout was intended to be intuitive by providing clear lables for columns and rows, with scannable instructions at top.	**No**--test participants did not see the bullets at the top of the matrix.

Note: See Table 3 for a list of the competing goals and their description.

The 2002 testing demonstrated that despite the redesign team's attempts at balancing the four usability goals, the matrix was not intuitive to most people. The matrix was a success among expert users, but a failure among novices. Several problems were discovered through usability testing: even after bulleting for easy scannability, users did not see the survey information displayed on the matrix webpage, the link "Choose Tables" in nearly every single cell did not help users differentiate between cells as they scanned the matrix, and novices had difficulty comprehending what was supposed to be in each cell of the matrix and made the matrix their last resort for finding data.[13] The failure of the matrix website was not necessarily that the instructions were not scannable, rather, the users were not looking for instructions—they were looking for data. Failure of the matrix meant that a new navigational scheme needed to be developed.

c. 2003 Prototype Development

Several elements contributed to the development of two new prototypes: feedback from the 2002 usability study, extensive paper prototyping, meetings of the redesign team, and programming feasibility. Feedback from the 2002 usability study was obtained from the redesign team meetings, verbal and written comments from users, subject-matter analysts, and usability experts at the Census Bureau. Paper prototyping consisted of drawing layouts of a webpage on paper and asking potential users for their comments. The redesign team meetings, held bi-weekly,

[13] During testing, only two links in the matrix were working. If a user hovered over the matrix, the mouse would indicate to the user, without even clicking, that the link was not active and was merely text. This may have been one reason why users, mostly novices, did not find success with the matrix. This was a problem with the test, not the site.

elicited feedback from users (including programmers) within the division about concepts and ideas for the prototypes. From these meetings, ideas or concepts for each prototype would often be challenged due to the programming constraints of the division.

The first 2003 prototype, called the long-list prototype, was designed to meet specific user expectations that participants voiced in the 2002 testing (see Appendix A.6). The left hand side of the screen had a blue bar that contained links to metadata. The middle portion of the screen was dedicated to navigation of poverty tables. The benefit of the long-list in comparison to the matrix used in the 2002 test was that it was simpler—instead of displaying links to lists of tables along two dimensions (characteristics and surveys), the long-list focused on characteristics. After clicking on a characteristic link, a user would immediately see a list of tables (see Appendix A.8). The results list assumed that certain users need specific types of information. By displaying several columns of information, users could scan for the information they needed before clicking on a table.

The second 2003 prototype, called the table finder prototype, maintained a blue bar as in the long-list prototype and the main area of the page contained a table finder—a series of side-by-side menus with a search button (see Appendix A.7). The goal of the table finder was to give users a choice on selection by characteristics, geography, time period and survey. The table finder located existing tables—it did not generate tables dynamically. The intent was to address the need to search by various dimensions (characteristic, geography, year, and survey) instead of one. After selecting the dimensions desired, the second level page would be identical to the results list used in the long-list prototype. One advantage to using the table finder was the ability

to allow users who did not specify a characteristic, data source, or year, to select all available characteristics or data sources and most recent year. A user who was more interested in just getting the number in poverty could do so without having to be forced to select a characteristic or data source.

IV. Study Methodology

a. Study administration

The study consisted of five parts: First, volunteers were recruited from within the Census Bureau by broadcast e-mail (see Appendix B.1) and interested volunteers were asked to fill out some basic information (see Appendix B.2). Of the 26 volunteers who responded, 10 study participants were selected to participate in the poverty usability study with the remainder chosen to participate in another usability study. Second, the selected study participants each filled out a pre-study questionnaire regarding computer background experience and Census Bureau data (see Appendix B.3). Third, each study participant was asked to find answers to questions about poverty data, using the two prototypes. Fourth, during the study and after every third and sixth question of each prototype, users were asked to give their feedback on the performance of each prototype. Fifth, a post-study questionnaire was given regarding preference, problems, changes of opinion, and ease of use for each prototype.

The study took place in November 2003 in usability labs at the Census Bureau Suitland Federal Center. The usability labs are equipped with one-way mirrors for analysts to observe the study participant, a speaker system so that the study administrator and the participant may

communicate with each other from their respective rooms, cameras above and to the right of the study participant to record study participant reactions to the web pages, and recording equipment connected to the participant's computer to allow the study administrators to view and document what the study participant sees and what they click on. Behind the one-way mirror, six individuals took turns administering the poverty website usability study. These individuals consisted of a usability researcher, a usability intern, two statisticians (one disability analyst, one poverty analyst) and two web programmers. One member of the redesign team administered the study as each participant performed the tasks and provided feedback, another team member recorded each study participant's actions, reactions, and answers to questions, while the remainder of the individuals observed from behind the one-way mirror, as their work schedules permitted.

The study administrator read a script to the study participant (see Appendix B.4) and asked the participant to fill out an initial questionnaire and consent form (see Appendix B.6 and B.5.) The tasks were given to each participant in a stack with each task on a separate sheet of paper. Each participant was left alone while the study administrator and observers remained behind the one-way mirror. The timer began after each participant finished reading the question out loud.

Participants were encouraged to think aloud as they performed each task expressing any thoughts, problem-solving strategies and expectations for what they thought would be behind a link before clicking on it. Using an intercom system, the study administrator probed participants who were not forthcoming with comments, by asking questions and reminding participants to "Think Aloud." The study took approximately one hour per person to test the two prototypes.

After each prototype had been completed, participants were asked to fill out a post-study questionnaire (See Appendix B.8). This questionnaire measured the level of satisfaction each participant had with the prototype with space for additional comments.

Any feedback participants gave, both verbally and non-verbally, as well as the time at which a task was presented and at which the task was completed, was recorded directly into a database. All studies were recorded with the camera recording the participant's face to capture their facial expressions, while the computer's video output was recorded directly onto tape, so that the study administrators could see the participants' actions on the screen, while viewing their facial reactions as a smaller picture-within-picture. Recording these studies on tape allowed them to be revisited for additional analysis.

b. Study participants

Volunteers were recruited from within the Census Bureau by broadcast e-mail (see Appendix B.2). The broadcast e-mail specified that the study participant would be a suitable candidate if they worked at the Suitland Federal Center, have some computer/Internet experience, have no web design experience, and did not typically search for data in tables on the web.

The screening process involved in selecting the ten study participants was partially random. From the pre-questionnaire results, volunteers were divided into three groups: novice, intermediate, or expert users (see Appendix B.3). In total, there were 14 novices, seven intermediates and five experts. Six novices, three intermediates, and one expert were chosen to

participate in the poverty study. The six novices consisted of an office automation clerk, an accounting technician, a secretary, a computer scientist and two human resource specialists. The intermediates/experts consisted of a special assistant, survey statisticians, and mathematical statisticians. All participants worked at the Census Bureau as full-time employees and were not paid to participate in this study.

c. Tasks

Tasks were chosen to cover questions a user might ask about poverty data. Previous data user requests were the basis of the questions the study participants tried to answer (see Appendix B.9). Questions were phrased in such a way as to avoid Census Bureau terminology. The number of tasks and the time estimated to complete each task were arranged so that the total time to complete the study was about one hour.

Each study participant saw both the long-list and table finder prototype and was asked twelve questions, six for each prototype; however, due to time constraints not every participant was asked every question. The six questions for each prototype were paired so that both sets of questions were of comparable difficulty and content. The order of the prototypes was randomized, so that not all study participants saw the long-list prototype first followed by the table finder prototype.

Study participants were given approximately five minutes to answer each question. As time ran out, the study administrator would ask the participant, “Do you want to move on to the next

question?" or "Do you feel that you are getting closer to the answer?" If users felt that they were on the right track, they were given more time to find the answer. When it was clear that the user was on the wrong track, the moderator moved the study participant on to the next question. These time constraints were not made explicit to the study participants.

d. Evaluation

The evaluations were based on quantitative data (length of time to find an answer, the number of correct answers found in the allotted time, and questionnaires using a Likert scale with averages computed for each question), video recordings, and notes taken during each study session. Each task had three possible outcomes: a success, failure, or time-out. Correct answers were categorized as a success, a failure was defined as an incorrect answers or if a participant gave up before the time limit, and if participants took longer than 5 minutes to answer questions and did not indicate they were close to finding an answer they were categorized as time-outs.

The number of clicks it took to get to an answer was recorded in the video sessions but not tabulated. Respondents were probed throughout study as the moderator continued to ask for their expectations, comments, and complaints. The team focused more on determining the causes of user behavior (through observing where the users clicked and what their comments were) and ways to increase user satisfaction and accuracy, rather than on drawing inferences from the numerical data alone.

V. Results of Usability Study

The 2003 usability study was conducted to find out how to improve the poverty website. As mentioned earlier, improving the poverty website meant meeting the four goals of accuracy, consistency, efficiency and intuitiveness. Accuracy was measured using participant success rates. "Success," for this study, was defined as finding the correct answer to the study question (the other alternatives were failure—an incorrect answer given by the participant or the participant giving up before the time limit—and time-out). Consistency was not measured within the poverty study itself, but was determined by whether the poverty prototype template could be applied successfully to the disability subject area. Efficiency in its strict sense meant the minimum number of mouse clicks required to obtain the correct answer. However, since the "minimum number of clicks" was a function of the design that was being studied, the design team examined the "average elapsed time participants took to find the correct answer," as a proxy, to find out whether participants could find the data as efficiently as the designers intended. Intuitiveness was measured by the failure rate and through users' comments. In theory, the more intuitive a website is, the more likely it is that a user will find the correct data in a shorter time. The failure rate allowed the redesign team to observe where things were not intuitive and the participants' comments helped the redesign team to understand why the participants clicked on one link and not another, and where the participants got confused.

The usability study indicated that neither the long-list prototype nor the table generator prototype out-performed the other. Each proved to be equally comparable in regard to resolving the competing goals with large differences in accuracy between novices and intermediate/experts.

The success rate for novices was 20 percent and 27 percent for the table finder prototype and the long-list prototype respectively, whereas the success rate was nearly three times as high for intermediates/experts at 76 percent and 81 percent. The success rates for novices were only modestly better than in the 2001 study (which had a 15 percent success rate among novice users). Even though novices were not finding the correct number as often as was hoped, the novice participants did not get lost within the website as often as in the 2001 study, and many of the failures resulted from misinterpreting the correct table, as opposed to not finding the table. For instance, when participants were asked to find the number in poverty for the nation, they would often read the first number in the first column; however the first column in most of the tables is the population total, with the second column providing the number in poverty. The usability study confirmed what tools and design principles were successful or a failure and helped to bring about new ideas from user comments and reactions.

Overall results on accuracy, efficiency, and intuitiveness for both prototypes and user types are displayed in Table 5. For the "table finder" prototype, the success rate was 20 percent and the failure rate was 53 percent. Of the failures, 47 percent was related to misinterpreting the tables and 33 percent was related to difficulty navigating through the website. Among the time-outs, the problem was mostly navigational. The average time it took novices to answer a question was 4 minutes and 34 seconds. In contrast, intermediates/experts took 2 minutes and 4 seconds with a 76 percent success rate. Results for the "long-list" prototype consisted of a 27 percent success rate for novices and an 81 percent success rate for intermediate/experts. Of the failures among novices, 47 percent were table related and 33 percent were navigational. The average time

novices took to answer a question was 4 minutes and 43 seconds, while intermediates/experts took 2 minutes and 29 seconds.

Table 5. Numeric Results for the 2003 Study

Table Finder Prototype Novice					***"Long-List" Prototype Novice***				
	Number	**Percent**	**Overall Success**	**Average Time**		**Number**	**Percent**	**Overall Success**	**Average Time**
Failure	16	53%	20%	274 seconds	**Failure**	15	50%	27%	283 seconds
Success	6	20%			**Success**	8	27%		
Time Out	8	27%			**Time Out**	6	20%		
Total Tasks	30	100%			**Total Tasks**	30	100%		
Table Finder Prototype Intermediate and Expert					***"Long-List" Prototype Intermediate and Expert***				
	Number	**Percent**	**Overall Success**	**Average Time**		**Number**	**Percent**	**Overall Success**	**Average Time**
Failure	4	19%	76%	124 seconds	**Failure**	1	5%	81%	149 seconds
Success	16	76%			**Success**	17	81%		
Time Out	1	5%			**Time Out**	3	14%		
Total Tasks	21	100%			**Total Tasks**	21	100%		

Intermediate/expert users outperformed novices in achieving success and in time spent on tasks. Even though the long-list prototype had marginally better success scores, it was not a clear "winner." Among the novices, the failures were mainly a result of misinterpreting the tables. However, users found the results list very useful. When the list was longer than what fit on the screen, they scrolled to the bottom. They were able to get a good idea of what information was in the tables before clicking on the table link. The design improved intuitiveness, as evidenced by the decrease in failure rates from the 2001 and 2002 study, with minimal cost to efficiency. From the main page to the results list, only one click was necessary. And if the user did not see what they wanted, they could easily click back without any frustration: expectations were met more closely than in the 2001 study, where frustration was evident and pervasive, according to the participants' feedback.

The blue bar to the left of the page proved to be a usability failure for the goal of intuitiveness only in the sense that users did not understand that the items were links. In a usability study conducted on a disability prototype with a similar blue bar layout, eye-tracking indicated that users did see the blue bar and therefore did not use it and placed their focus more to the center of the page.[14] The original approach to using the blue bar was to maintain the look and feel of the www.census.gov homepage. Eye-tracking indicated that users likely did not think the items in the blue bar were links. When the blue bar was altered to include lines under the terms to indicate that they were links, users began to click on them. By changing the link colors or using the standard blue underlining, this would help to alert users that something is there and that they are links.

While the table finder and results list resolved many of the competing goals, some were not resolved. The prototypes were not 100 percent complete, therefore, a true picture of user behavior could not be observed. Resolution for some of the competing goals could have resulted because the website was small, but once all the data are implemented into the table finder, users might find the result lists overwhelming.

The questionnaire on user interaction satisfaction given after each prototype helped to measure intuitiveness by addressing how satisfied each user was with the prototypes (see Appendix B.6).

[14] To record the eye movements; participants rested their chins on a chin rest facing the computer monitor. The Eye Response Interface Computer Aid (ERICA) eye tracking system was used to capture eye data by placing an eye-tracking camera below the monitor, facing the chin rest. The chin rest and camera were adjusted appropriately. After calibrating the eye camera for each participant, a series of tasks was read for the participant to complete. The tasks read in random order and varied for each participant. An eye-tracking camera can record a user's eye movements by capturing and following the reflection from an eye, created by bouncing infrared light off of the eye. Eye tracking can be used to examine web visual paths, locations of fixations, and fixation times. This data can in turn determine areas of interest on a screen, optimal information layouts, and aesthetic appeal.

Users evaluated each prototype on various dimensions on a scale of 1 to 5 with 1 indicating disagreement with the statement and 5 indicating complete agreement. Due to the low failure rate among intermediates/experts, the following discussion focuses on novices. Scores indicated that users felt slightly more positive towards the website than in the 2001 study. The table finder prototype had an average satisfaction score of 3.47. This score was only slightly higher than the long-list prototype, which had an average satisfaction score of 3.27. The 2001 study had an average satisfaction score of 2.97 among novices. These scores indicated user satisfaction with the website and did not indicate success, as the table finder prototype had a lower success rate at 20 percent than the long-list prototype at 27 percent. While these satisfaction scores for novices appear mediocre, they contrast with the degree of frustration users expressed verbally in the 2001 study.

VI. Conclusion

Cognitive testing helped to improve the poverty website by verifying whether the proposed solutions adequately met the four goals, and by providing more ideas and feedback. Some of the team's hypotheses about balancing the four usability goals were confirmed and others disproved through iterative testing, which culminated in the 2003 study. The low success rate for novices and high success rate for intermediates/experts indicated that the team's assumptions were not incorrect, only that the scope of the redesign project was limited to fixing navigational issues, not necessarily redesigning the tables at this stage. Table 6 summarizes how well the 2003 study prototypes resolved the competing goals.

Table 6. Competing Goals in the 2003 Study, Proposed Solution and Outcome

Competing goals	Proposed solution in 2003 prototypes	Did it work?
Accuracy vs. Consistency	**Long-list prototype:** Each subject area could have put its own characteristics on the front page (accuracy) and would have retained the same look and feel. The results list contained a column for "survey," since users did not search by survey. **Table finder prototype:** Each subject area could have put its own characteristics into its table finder, or created another menu for the table finder specific to that subject area, while retaining the same look and feel.	**Long-list: No.** "Characteristic" is not a useful dimension for conducting searches for disability data since disability tables tend to repeat the same characteristics, for different types of disability. Putting each disability type as links in a long list on one page would be misleading since there is no single definition for "disability." **Table finder: Yes**. Adding disability type as another menu to a table finder is clear, because the items in each column of menus can be grayed out based on the first option selected--which provides clearer guidance as to which data belong together.
Accuracy vs. Efficiency	**Long-list prototype:** In contrast with the matrix, the long list did not break each characteristic down by survey, but it did allow more detailed characteristics on the main page -- thereby keeping the results lists short and tables within two clicks (efficiency). The results list kept the same features as in the 2002 study, but added three new columns: Data source, Geography, and Year. **Table finder prototype:** Users could search by multiple dimensions, but only one dimension per category could be shown.	**Long-list: Yes.** **Table finder: Yes.** In both prototypes, users could get to tables in two mouse clicks (efficiency) and the results page helped them find the appropriate table (accuracy).
Accuracy vs. Intuitiveness	**Long-list prototype:** Since more space on the screen was devoted to the names of characteristics, more detail could be provided for specific characteristics (accuracy) and less jargon was used (intuitiveness). **Table finder prototype:** Provided default categories for "any survey," "National" or "any year," for users who did not know what to select (intuitiveness). The results list, however, would be longer for the user to search through, although conceivably the user could learn about surveys by examining the columns of the results list from repeated queries (accuracy). **Both prototypes** relied upon the "what's in the table" column of the results list to summarize the contents of tables in plain language (intuitiveness).	**Long-list: Yes.** **Table finder: Yes.** In both prototypes, test participants were able to find tables two screens in from the main page (efficiency). They knew how to navigate both sites, and commented that the results pages help them decide which table to click on (intuitiveness). Prototypes could be made more intuitive by editing the results pages and improving the format of the tables themselves (although that is beyond the current project scope).
Consistency vs. Efficiency	**Long-list prototype:** subjects with very few characteristics could provide more subcategories of each characteristic on its main page (efficiency), and thus make each results list behind those links shorter than would a subject area (like poverty) that tabulated many different characteristics in different tables (consistency). **Table finder prototype:** since the menus were scrolling menus, the relative length of any one menu does not break the look and feel (consistency). Different subject areas, if needed, could even add another menu column specific to their content to ensure all their tables were accessible from the table finder (efficiency).	**Long-list: No.** The format did not lend itself well to disability data and therefore did not achieve the goal of consistency, even though it was technically possible to put tables two clicks away from the main page. **Table finder: Yes.** A table finder was developed for disability (consistency) and tables were available two clicks away from the table finder (efficiency).
Consistency vs. Intuitiveness	**Long-list prototype**: was intended to provide links to tables by characteristic on the central portion of the page, with metadata in a vertical sidebar. The characteristics themselves could vary while retaining the look and feel. **Table finder prototype:** Most subject areas present different data by survey, characteristic, year, and geography, although other dimensions may be added or substituted as needed for particular subject areas.	**Long-list: No.** Although novice users especially found it simple to click on the characteristic links (intuitiveness), the site was not well suited for disability data (consistency). **Table finder: Yes.** The format suited both disability data and poverty data (consistency) and test participants knew how to use the interface, and expressed that they enjoyed the control (intuitiveness).
Efficiency vs. Intuitiveness	**Long-list prototype:** More space was devoted to the characteristic links, thereby facilitating plainer language while providing more links to specific information off the main page. **Table finder prototype**: The scrolling menus offer the user a sense of control (intuitiveness), and provide a very large number of choices off the main page (efficiency) without displaying the full array of combinations at the same time (intuitiveness). **Both prototypes** rely on the columns of the "results list" to make clear what is in each table, after the user has made his or her selection (intuitiveness).	**Both prototypes: Yes, with limitations.** Novice users knew how to use both prototypes, and roughly half the time they clicked on the table with the correct answer; however, the tables were frequently misunderstood. Improving the usability of the tables was out of scope for the current project. Also, the test did not measure whether users could find out why poverty data from two different tables might disagree for a particular demographic group or geographic area. Few users commented on the "Data source" column in the results list.

The results received from the usability studies, in conjunction with results from eye-tracking of the disability websites, has helped the design team create a more usable poverty website by balancing four usability goals. Cognitive testing was instrumental in allowing the designers the chance to improve the experience and satisfaction users receive from going to the Census Bureau Poverty website and getting the information they need.

VII. Future of the Census Bureau Poverty Website

While cognitive testing helped to bring to light the flaws and successes of the two prototypes in the 2003 study, the future Census Bureau Poverty website will not look like the prototypes tested. In order to achieve consistency throughout the division at the Census Bureau, the prototypes tested in the 2003 study needed to accommodate other subject matter areas. After completion of the 2003 study, an attempt was made to fit another subject matter area—disability—into the templates used for the poverty website. Each attempt to fit disability data into the poverty long-list template failed. Poverty data have been cross-tabulated by more combinations of other characteristics than have disability data, and for that matter, most other subject areas studied within HHES. Therefore, the table finder prototype was selected as the basis for future websites. However, several more adjustments needed to be made to the website template to make non-numeric information easier to find.

The new format used was a modified version of the front-page format used by the Bureau of Labor Statistics (BLS) (See Appendix A.6). Through five rounds of testing and evolving prototypes after each round, BLS arrived at their final website template in October 2001 and that format is still in use today. In addition, an altered version of the BLS's website underwent

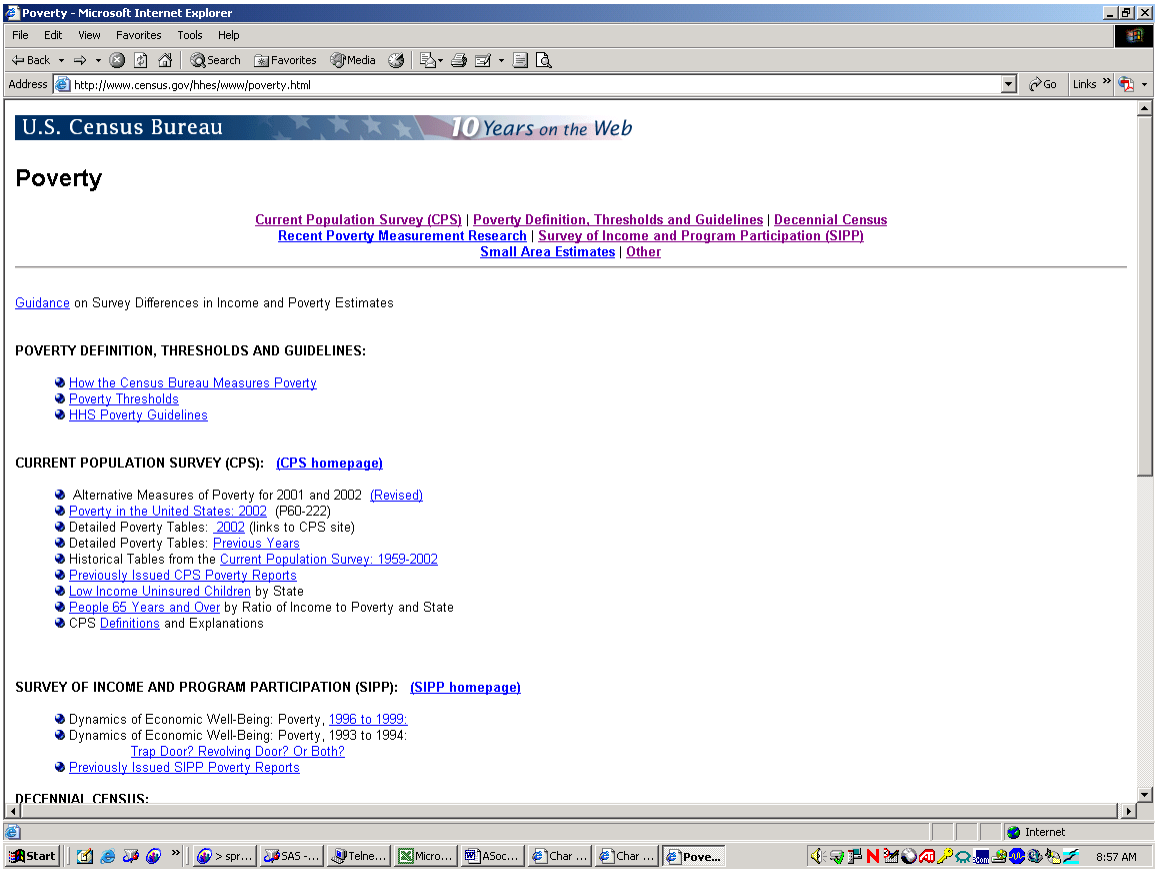
usability and eye-track testing at the Census Bureau for the Disability website. Results from that study proved very favorable. Eye-tracking data indicated that a high proportion of users eyes were first drawn to the yellow box, where data search tools—such as a link to the table finder, now labeled "search by topic"—were housed in the top yellow box and high-profile statistics or new releases in the bottom yellow box. Users were better able to distinguish where to go for data (in the yellow boxes) versus metadata (the links to the left and right of the yellow boxes). The future version of the Census Bureau Poverty website can be seen in Appendix A.5.

In that new format, items that were previously in the blue bar from the 2003 study are now displayed to the left and right of the yellow boxes. The more successful elements of the previous prototypes – namely, the table finder and the format of its results pages – were maintained in the new format. The table finder will be showcased in the yellow box as one of many data search features available. This will allow users to search by other means if they did not feel comfortable with the table finder or wished to search by another dimension. A Google search feature was included and displayed at the top right hand corner of the main page. Based on users comments, the redesign team also added an overview section – which was developed to provide basic information about what data may be found on the website, and a few basic facts. In addition, the bottom yellow box would contain high profile numbers which were most requested by users.

Appendix A: Poverty Prototypes

A.1 Current Poverty Website

Note: The Current Poverty Prototype does not fit on one screenshot. Therefore, two screen shots are shown below



Poverty - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://www.census.gov/hhes/www/poverty.html Go Links

- Dynamics of Economic Well-Being: Poverty, 1996 to 1999:
- Dynamics of Economic Well-Being: Poverty, 1993 to 1994:
  Trap Door? Revolving Door? Or Both?
- Previously Issued SIPP Poverty Reports

DECENNIAL CENSUS:

- Census 2000
- 1990 Census
- 1960, 1970, 1980 Census

RECENT POVERTY MEASUREMENT RESEARCH

OTHER:

- Small Area Income and Poverty Estimates
- FERRET Data Extraction and Review Tool (March CPS and SIPP Data):
  Look at already created tables or create your own tables/extract files

Surveys-on-Call - Data Extraction System to create custom data extracts from surveys
CD-ROM Ordering Information
Requests for Special Tabulations

Related Sites - Institute for Research on Poverty
Northwestern University/University of Chicago Joint Center for Poverty Research

Source: U.S. Census Bureau

Contact the Housing and Household Statistics Division Information Staff at (301)763-3242 or visit ask.census.gov for further information on Poverty Statistics.

Go to Income Statistics

Last Revised: ***April 29, 2004***

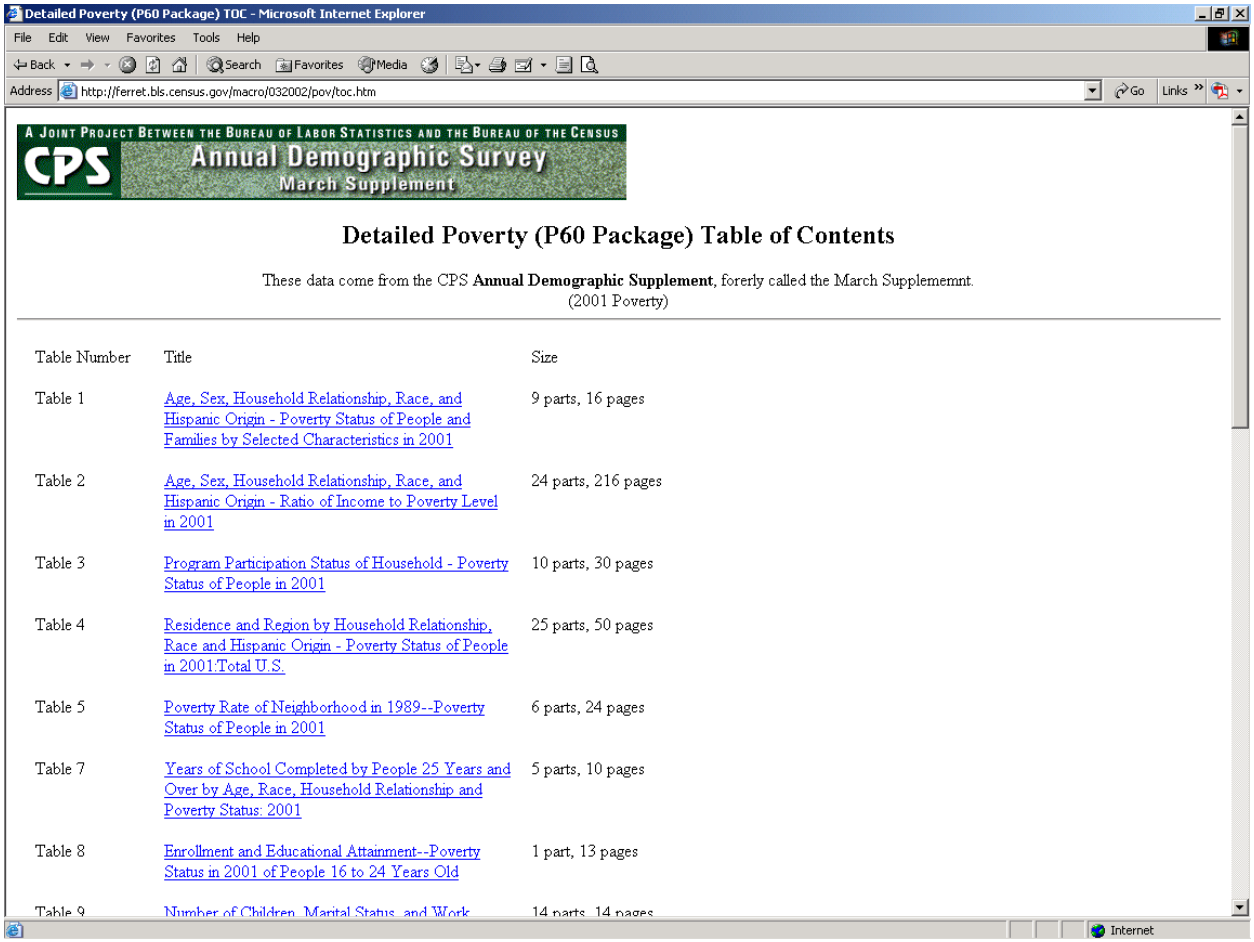
Census 2000 | Subjects A to Z | Search | Product Catalog | Data Tools | FOIA | Quality | Privacy Policy | Policies | Contact Us | Home

USCENSUSBUREAU
Helping You Make Informed Decisions

Internet

Start > spr... SAS -... Telne... Micro... ASoc... Char ... Char ... Pove... 8:59 AM

A.2 Poverty Table Titles



Detailed Poverty (P60 Package) TOC - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://ferret.bls.census.gov/macro/032002/pov/toc.htm

A Joint Project Between the Bureau of Labor Statistics and the Bureau of the Census

CPS Annual Demographic Survey March Supplement

Detailed Poverty (P60 Package) Table of Contents

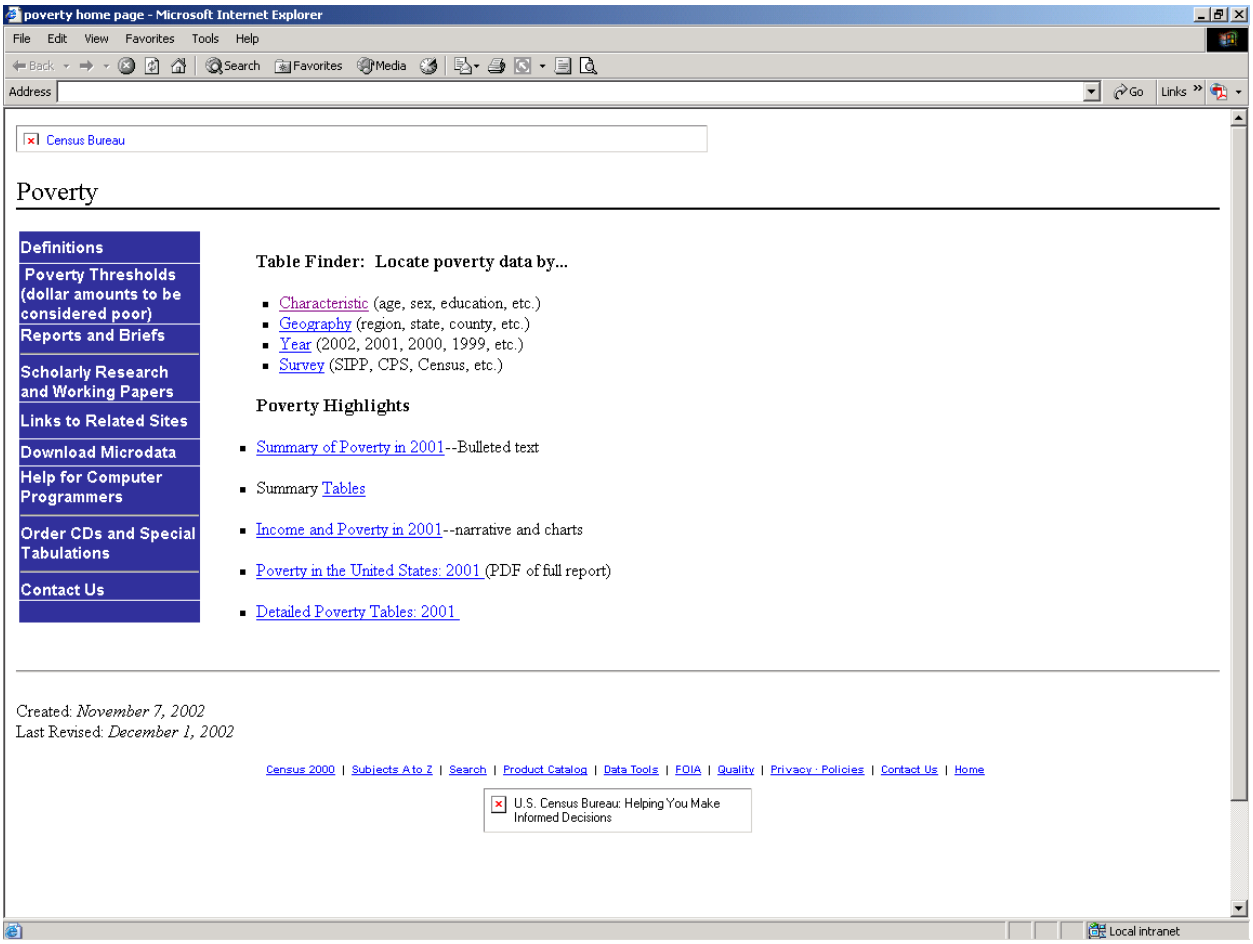
These data come from the CPS **Annual Demographic Supplement**, forerly called the March Supplememnt.
(2001 Poverty)

Table Number	Title	Size
Table 1	Age, Sex, Household Relationship, Race, and Hispanic Origin - Poverty Status of People and Families by Selected Characteristics in 2001	9 parts, 16 pages
Table 2	Age, Sex, Household Relationship, Race, and Hispanic Origin - Ratio of Income to Poverty Level in 2001	24 parts, 216 pages
Table 3	Program Participation Status of Household - Poverty Status of People in 2001	10 parts, 30 pages
Table 4	Residence and Region by Household Relationship, Race and Hispanic Origin - Poverty Status of People in 2001:Total U.S.	25 parts, 50 pages
Table 5	Poverty Rate of Neighborhood in 1989--Poverty Status of People in 2001	6 parts, 24 pages
Table 7	Years of School Completed by People 25 Years and Over by Age, Race, Household Relationship and Poverty Status: 2001	5 parts, 10 pages
Table 8	Enrollment and Educational Attainment--Poverty Status in 2001 of People 16 to 24 Years Old	1 part, 13 pages
Table 9	Number of Children, Marital Status, and Work	14 parts, 14 pages

Internet

These tables are numbered, and usually have long titles that describe what characteristics appear in the table. If a user were to refer to "Table 1," it would not be clear which table he or she were referring to unless the user also specified the report or table package from which it came.

A.3 Main Page Poverty Prototype (as tested in the 2002 study)



A.4 Characteristics Matrix (as tested in the 2002 Study)

Char matrix - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address Go Links

U.S. Census Bureau

Poverty Poverty Main Page ---> Table Finder: Search by Characteristic

- Need **most current** poverty? Use **CPS** (about CPS)
- Need **low-level geography?** Use **Census 2000** or **1990 Census** (about Census 2000 and 1990 Census)
- Need **low-level geography between Census years?** Use **ACS** (about ACS)
- **How long do people stay poor?** Use **SIPP** (about SIPP)

Tables by Characteristic (definitions)	Current Population Survey (CPS)	Census 2000	1990 Census	American Community Survey (ACS)	Survey of Income and Program Participation (SIPP)
Age	Choose Tables	Choose Tables	Choose Tables	Choose Tables	Choose Tables
Sex	Choose Tables	Choose Tables	Choose Tables	Choose Tables	Choose Tables
Family and household	Choose Tables	Choose Tables	Choose Tables	Choose Tables	Choose Tables
Race, Ethnicity, Nativity, Citizenship	Choose Tables	Choose Tables	Choose Tables	Choose Tables	Choose Tables
Severity of poverty (percentages of the poverty level; poverty gap)	Choose Tables	Choose Tables	Choose Tables	Choose Tables	Choose Tables
Work	Choose Tables	Choose Tables	Choose Tables	Choose Tables	Choose Tables
Education	Choose Tables	Choose Tables	Choose Tables	Not available	Choose Tables
Source of income	Table 18	Not available	Not available	Not available	Choose Tables
Program-related	Choose Tables	Choose Tables	Choose Tables	Choose Tables	Choose Tables
Disability	Not available	Choose Tables	Choose Tables	Not available	Not available
Health insurance	Choose Tables	Not available	Not available	Not available	Choose Tables
Alternative Poverty Measures	Choose Tables	Not available	Not available	Not available	Not available

Last Updated on 2/3/03
By Joe Dalaker

Done Local intranet

A.5 Results List

U - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address Go Links

U.S. Census Bureau

Poverty | Poverty Main Page ---> Table Finder: Search by Characteristic ---> CPS Poverty tables: Race, Ethnicity, Nativity, Citizenship

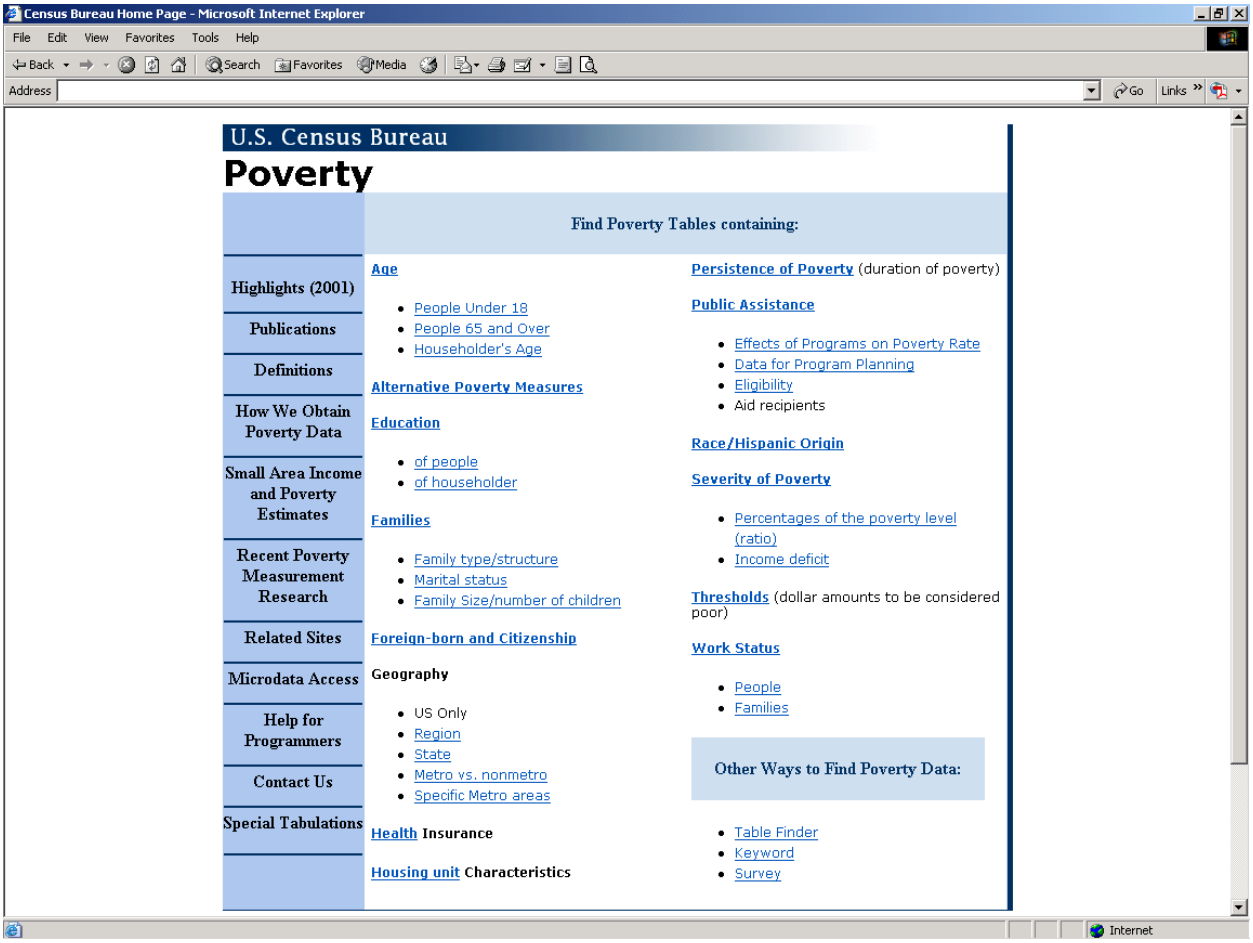
CPS Poverty Tables -- Race and Ethnicity; Nativity and Citizenship

Race and Ethnicity:

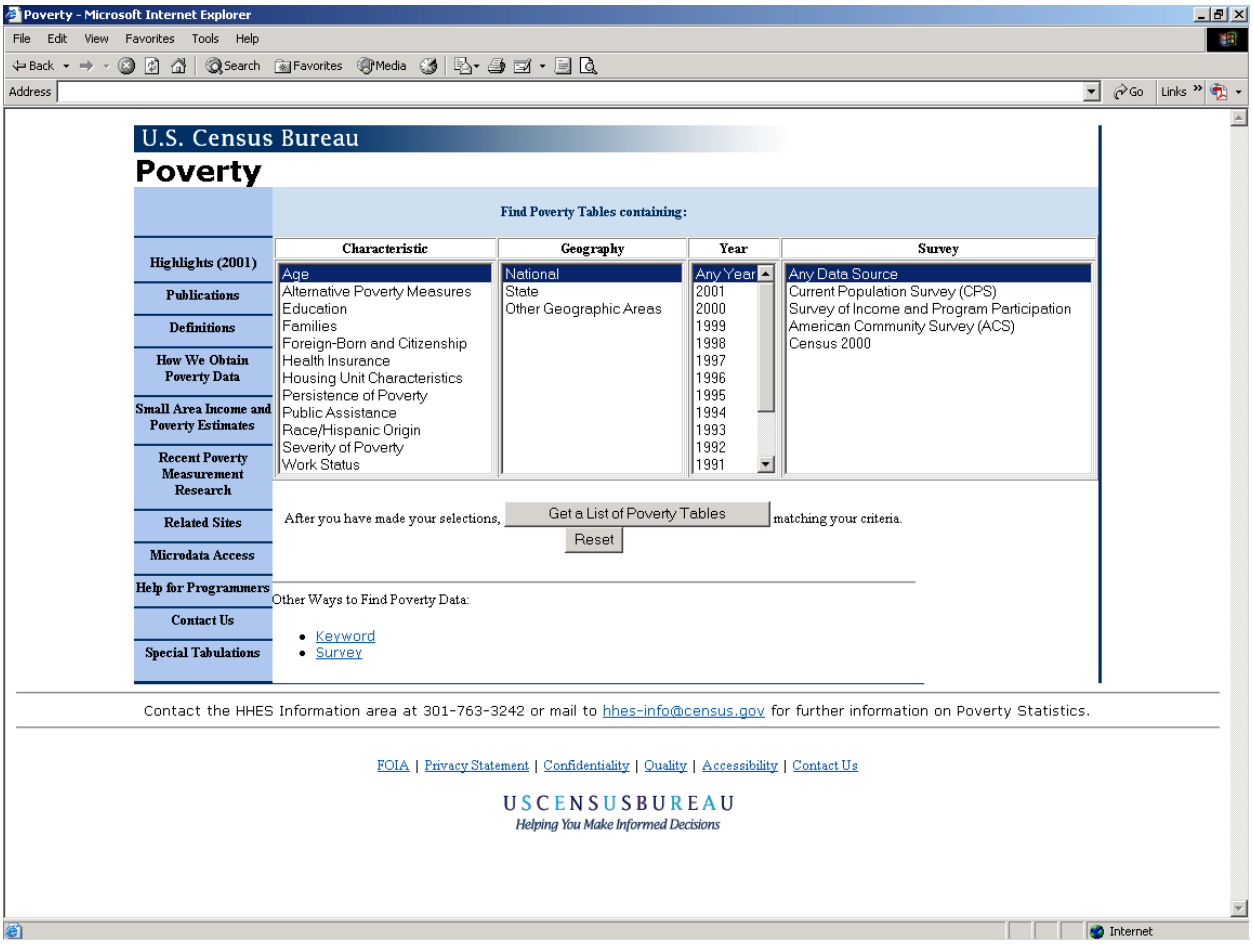
Table #	What's in the table	Races and Ethnicities shown
Table 1	• Number of poor and poverty rate of people by race and ethnicity • Age • Sex • Family Type (or whether a person lives in a family at all) • Whether or not children live in the person's family	• All races • White • Black • Hispanic origin (may be of any race) • White non-Hispanic
Table 2	• Number and percent of people below multiples of the poverty level (50% of poverty, 100%, 125% of poverty, etc.) • Age • Sex • Family Type (or whether a person is in a family) • Household Relationship (householder, spouse, householder's child, not related, etc.)	• All races • White • Black • Hispanic origin (may be of any race) • White non-Hispanic • Non-Hispanic of all races • Asian and Pacific Islander
	• Program participation (whether anyone in the household received aid) • Age • Sex • Family Type (or whether a person is in a family) • Household Relationship (householder, spouse, householder's child, not related, etc.)	• All races • White • Black • Hispanic origin (may be of any race) • White non-Hispanic

Done Local intranet

A.6 Long-List Prototype from 2003 study



A.7 Table Finder Prototype from 2003 Study



A.8 Second-level page of prototypes from 2003 study

If Family had been selected from the long-list prototype or from the Characteristics box of the Table Finder this is the Results List that would be displayed.

Poverty - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address Go Links

U.S. Census Bureau

Poverty - Families

Table #	What's in the table	Family Characteristics shown:	Data Source	Geography	Year

Table 1	• Age
	• Sex
	• Household relationship
	• Whether children live in the family
	• Below poverty level
		• Families
		  ○ with Related children under 18
		• Married-couple
		  ○ with related children under 18
		• Female Householder, no spouse present
		  ○ with related children under 18
		• Unrelated Individuals
		• Unrelated Subfamilies
			Current Population Survey (CPS)	National Only	2001

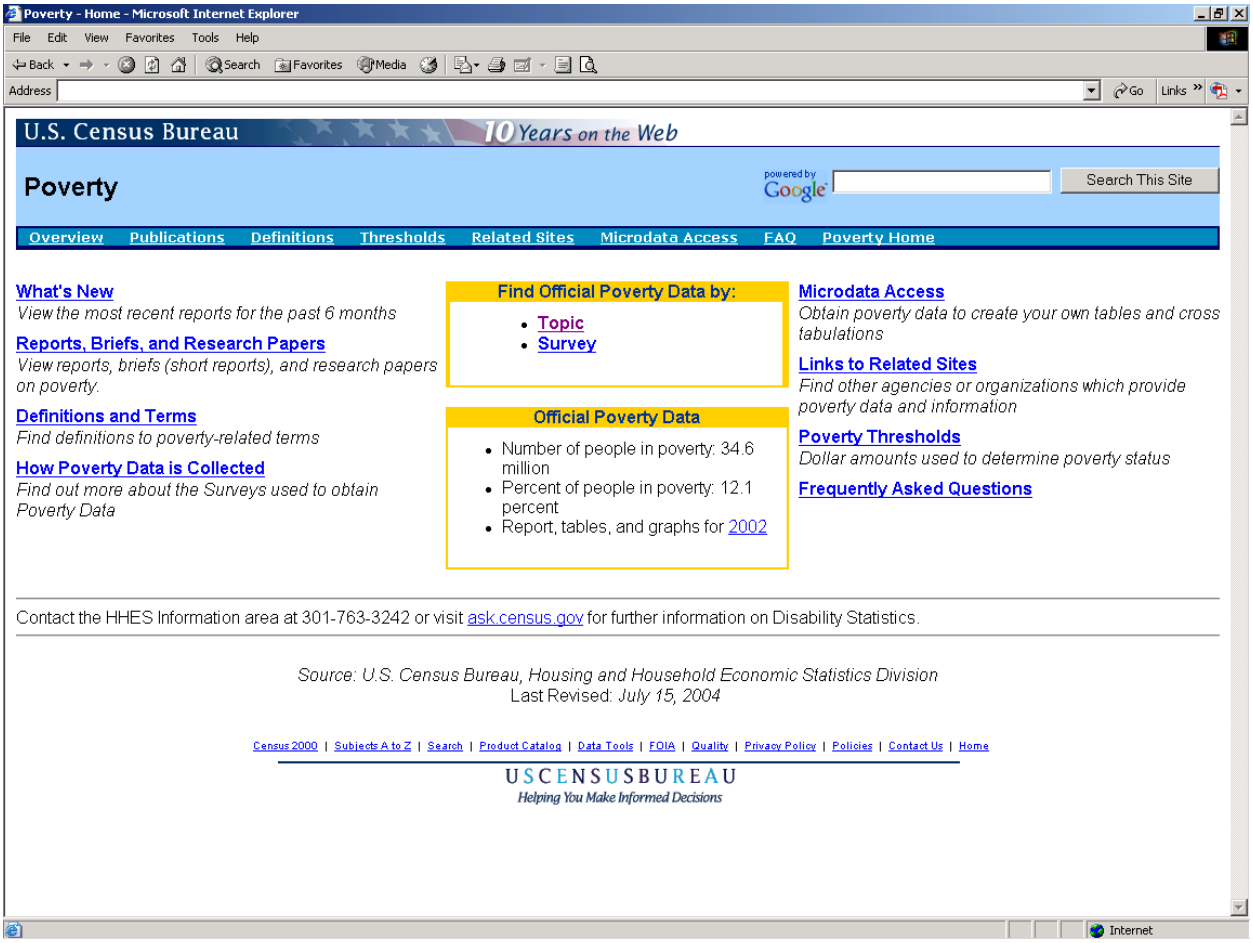
Table 2	• Age • Sex • Household Relationship • Ratio of Income to Poverty • Public Assistance	• Householder • Married-couple • Female Householder • Male Householder • Unrelated subfamilies • Unrelated individuals	Current Population Survey (CPS)	National Region Metropolitan Areas Central Cities	2001
Table 4	• Age • Sex • Family Type/Whether Person Has a Family • Whether children live in the family • Below poverty level	• Householder • Married-couple • Female Householder • Male Householder • Unrelated subfamilies • Unrelated individuals	Current Population Survey (CPS)	National Region Metropolitan Areas Central Cities	2001

PCT59	• Family type
	• Social Security Income
	• Public Assistance
		• Married-Couple
		• Other Family
		  ○ Female Householder
		  ○ Male Householder
			Census 2000 - Summary File 3	National
				(Other geographies available)
					1999

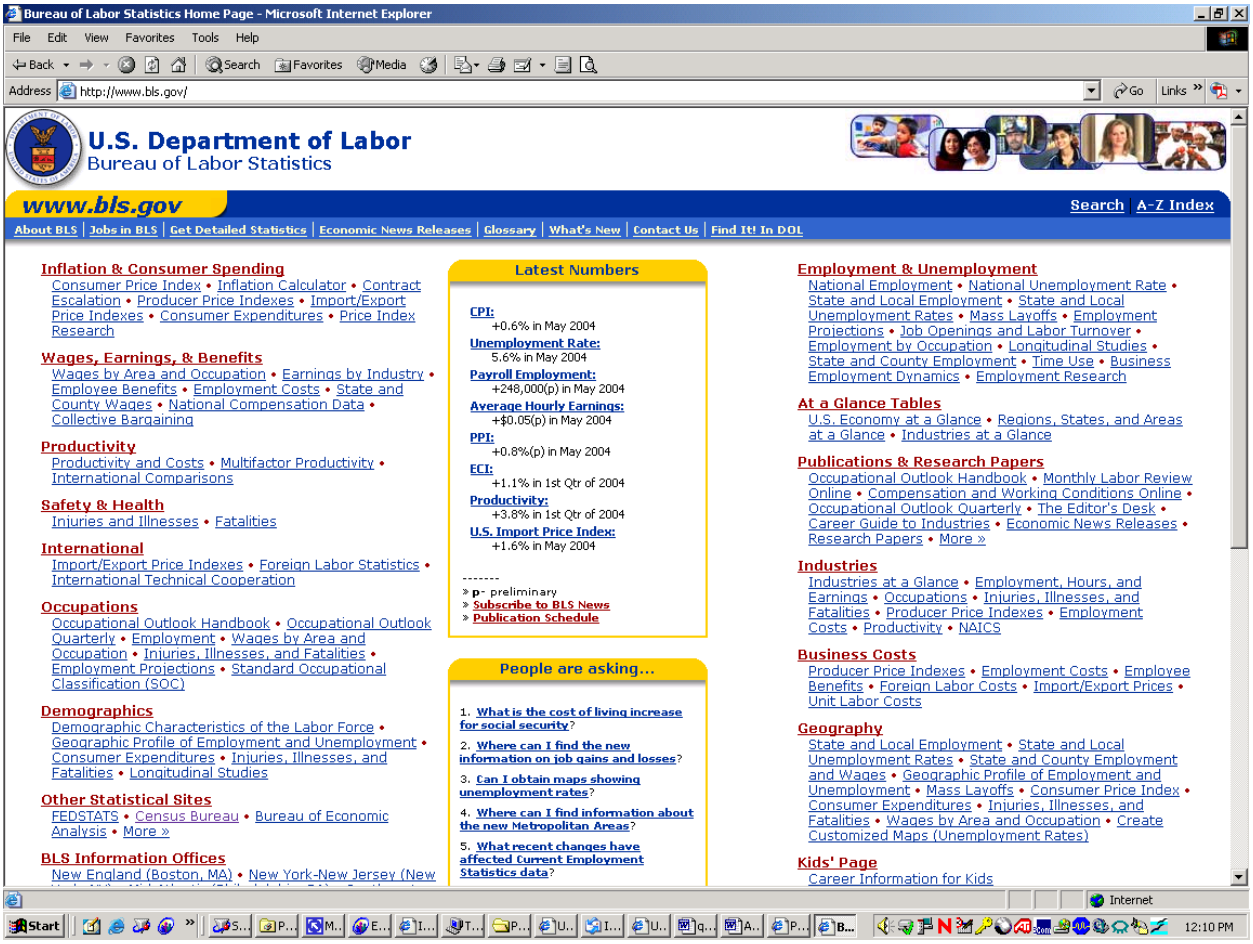
	• Family type • Work status of	• Married-Couple • Other Family			1999

Internet

A.9 Future of Census Bureau Poverty Website



A.10 BLS Current Website



Appendix B: Questionnaire, Script and Forms

B.1 Volunteer Broadcast

October 29, 2003

Volunteers Wanted - Web Usability Study

NOT a housing, poverty, or disability data expert? Then we want YOU!

Are you interested in helping the Census Bureau improve HHES's website? If so,

volunteer to test various web site prototypes in SRD's Usability Lab in

Building 4 from November 17 to November 21. Tests take approximately an hour.

Suitable candidates would . . .

Work at Suitland Federal Center

Have some computer/Internet experience

Have no web design experience

Not typically search for data in tables on the web

In return for volunteering, you'll get the satisfaction of knowing you are

helping our users get easier access to data on web sites (and a chocolate

treat)!

Please respond by November 7, 2003.

For more information and to sign up on-line,

click here.

B.2 Sign-up Form

HHES Usability Study Sign-Up Form

Please fill out the following form to submit your name for the HHES usability study. **Due to time constraints, not everyone who completes this form will be selected for the study**, but we will contact everyone via email to let them know if they have or have not been selected, so please ensure that your email address is correct.
For more information, see our project overview.

Name:	
Division:	
Phone Number:	
Email Address:	
What are some times that you would be available during the week of November 17 through November 21 to participate in the study (approximately 1 hour)?	
Would you be interested in being contacted about other usability studies by the HHES? Your contact information would only be used internally by HHES.	Yes No

Submit Reset

B.3 Recruiting Questions—HHES Census Website Usability Test 2003

Question:	Answer:	Requirement for Novice User	Requirement for Intermediate User	Requirement for Expert User
1) How often do you use the internet?		At least twice a week	At least three times a week	At least three times a week
2) How long have you used the internet?		At least a year	At least two years	At least three years
3) Have you ever downloaded a file from the internet?		No	Yes	Yes
4) Are you comfortable viewing data in a table?		No	Yes	Yes
5) Have you exported data from the web into a spreadsheet or manipulated data on the web?		No	Any answer	Yes
6) Are you familiar with demographic Census data (terminology, structure, etc.)?		No	Any answer	Yes
7) How often do you use demographic Census data?		Never	1 – 2 two times a year	Several times a year
8) Are you familiar with microeconomics?		No	No	Yes
9) Are you familiar with economic and/or business data?		No	Yes	Yes
10) What is your educational background in economics, business, or a related field (have them list field)?		No economics or business training above first year of college	Undergraduate/Graduate major or minor; or some college and an answer of at least two years to the following question	Graduate major; Undergraduate major or minor with an answer of at least 4 years to next question
11) What is your work experience in economics, business, or a related field (have them list field)?		Anything below one year	Any answer with a graduate degree; One year or more with an undergraduate degree; or two years or more with some college	Graduate degree at least two years; Undergraduate degree at least 4 years
12) Does your work/school require you to use demographic Census data?		No	Any answer	Yes
13) Does your work/school require you to use demographic data?		No	Yes	Any answer

B.4 Script

Script for HHES Website

Thank you for your time today. We will be evaluating a prototype of the HHES Disability website by having you work on several tasks. The site is not complete and there might be areas where you will not find content. That's normal.

Your experience with the Website is an essential part of our work. We are going to use your comments to help in the development of the site. Your comments and thoughts will help us improve the site. As this is only a paper prototype, and is not final at all, please don't feel like you have to hold back on your thoughts to be polite. Tell us both your positive and negative reactions to the site. And remember, there are no right or wrong answers. We aren't evaluating you but rather how the prototype works.

Unless you have a serious objection, we would like to video tape you during the study. We use it to help analyze the data for this project, mainly because we cannot remember everything. Will this be all right? We also have a pre questionnaire that we ask you to fill out. This will give us information about your computer and Internet experience.

- Give User Pre-questionnaire
- Give User Consent form

For the next 30 minutes I'll ask you to work on a number of tasks. I'd like you to tell me your impressions and thoughts as you work through the tasks. We would like you to "think aloud" as you work on your tasks. This means that as you work on a task, talk to me about 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.

Do you have any questions about the "think aloud" process we ask you to use?

Do you have any other questions now? We'll be able to see and hear you on the television monitor, so if you have any questions during the session please just ask us.

- Give User Tasks

When ready to begin first task:
Begin each task by reading the task question out loud. As you work tell me which link you would click on to get to the answer to your task question. Then I (or my assistant) will act as the computer and put the new screen down.

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." After each task I will return us to the homepage where you can begin the next task.

B.5 Consent Form

CONSENT FORM

The Census Bureau routinely tests products used for collecting data or disseminating data in order to produce the best products possible.

You have volunteered to take part in a study to improve a product used for disseminating Census Bureau data. In order to have a complete record of your comments, your interview session will be audio-taped/video-taped. We plan to use the tapes to improve the product. Staff involved in this product design research will have access to the tapes. The tapes may also be used for training others to conduct this type of research and in presentations to professional audiences.

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

Furthermore, I understand that the data dissemination product being tested is still preliminary in nature and not yet ready to be released to the public. I understand that I may not publicize, critique, or otherwise discuss or characterize the project until the final product is officially released by the Census Bureau.

_____

Participant's Signature

_____

Printed Name

_____

Date

B.6 Initial Questionnaire

Initial Questionnaire

1. What computer applications do you use?
Mark (X) *all that apply*

- ☐ e-mail
- ☐ Internet
- ☐ Word processing (MS-Word, WordPerfect, etc.)
- ☐ Spreadsheets (*Excel, Lotus, Quattro, etc.*)
- ☐ Databases (MS-Access, etc.)
- ☐ Accounting or tax software
- ☐ Engineering, scientific or statistical software
- ☐ Other applications, please specify _____

	Not at all Comfortable				Very Comfortable
2. How *comfortable* are you in learning software applications that are new to you? *Circle one number for each*	1	2	3	4	5
3. Computer windows can minimized, resized, and scrolled through. How *comfortable* are you in manipulating a window?	1	2	3	4	5
4. How *comfortable* are you using and navigating through the Internet?	1	2	3	4	5

	Never				Very Often
5. How *often* do you work with any type of data through a computer?	1	2	3	4	5
6. How *often* do you perform complex analyses of data through a computer?	1	2	3	4	5
7. How *often* do you use the Internet to find data?	1	2	3	4	5
8. How *often* do you use websites or printed reports to get data?	1	2	3	4	5
9. How *often* do you use population data?	1	2	3	4	5

	Not at all familiar				Very familiar
10. How *familiar* are you with population (terms, data, etc)?	1	2	3	4	5
11. How *familiar* are you with the America Community Survey (terms, data, etc.)	1	2	3	4	5
12. How *familiar* are you with Census Bureau terminology?	1	2	3	4	5

B.7 Feedback during Usability Testing

After task three and six, the study administrator should seek feedback from the user by asking something similar to the following:

- I'm going to stop you now for a moment and ask you for your overall reaction to the site. On a scale of 1-5, with 1 being **terrible** and 5 being **wonderful**, how would you rank the site?
- On a scale of 1-5, with 1 being **frustrating** and 5 being **satisfying**, how would you rank the site?
- On a scale of 1-5, with 1 being **difficult** and 5 being **easy**, how would you rank the site?

Extras:

- How satisfied are you with the answers you have been able to find on the site?
- Have the links been leading you where you expected?

Answers during each task section:

I. Overall reactions to the site:

a. Terrible	1	2	3	4	5	Wonderful
b. Frustrating	1	2	3	4	5	Satisfying
c. Difficult	1	2	3	4	5	Easy

II. Overall reactions to the site:

d. Terrible	1	2	3	4	5	Wonderful
e. Frustrating	1	2	3	4	5	Satisfying
f. Difficult	1	2	3	4	5	Easy

B.8 Questionnaire for User Interaction Satisfaction (QUIS)

Questionnaire for User Interaction Satisfaction (QUIS)

Instructions: For each item, please circle the number that most appropriately reflects your impressions about using this website.

1. **The tasks can always be performed in a straight-forward manner.**
   Disagree 1 2 3 4 5 Agree

2. **The information on the site is very disorganized.**
   Disagree 1 2 3 4 5 Agree

3. **The use of terminology throughout the site is consistent.**
   Disagree 1 2 3 4 5 Agree

4. **The arrangement of information on the screen is illogical.**
   Disagree 1 2 3 4 5 Agree

5. **The use of Census Bureau-specific terminology is appropriate.**
   Disagree 1 2 3 4 5 Agree

6. **The characters on the computer screen are hard to read.**
   Disagree 1 2 3 4 5 Agree

7. **The experienced and inexperienced user's needs are taken into consideration:**
   Disagree 1 2 3 4 5 Agree

8. **Learning to use the site is difficult.**
   Disagree 1 2 3 4 5 Agree

9. **Overall reactions to the site:**
   a. Terrible 1 2 3 4 5 Wonderful
   b. Frustrating 1 2 3 4 5 Satisfying
   c. Difficult 1 2 3 4 5 Easy

Please add any additional comments:

B.9 Poverty Questions used in 2003 study

Poverty Questions for the Long-list Prototype

1. Find the poverty rate--the percent who are poor--for the U.S.

Correct answer: 11.7 percent in 2001 OR
12.1 percent in 2002

2. Find the poverty rate–the percent who are poor--for Asians and Pacific Islanders.

Correct answer: 10.0 - 10.3 in 2002 – should comment that category is no longer APIs
OR
10.2 percent in 2001 OR
10.8 percent in 2000

3. Does the poverty measure count income before taxes or after taxes?

Correct answer: before taxes

4. You are running a computer program, and consistently get more people in poverty nationally than is reported by the Census Bureau. Find documentation on the Census Bureau website written for people who want to compute poverty data with their own programs.

Correct answer: should get to "help for programmers" page and see the heading, "I can't match your totals!"

5. What was the poverty rate in New Mexico? (use the most current information you can find)

Correct answer: 18.0 percent in 2001 OR
17.8 percent based on a 3-yr avg. 2000-2002 OR
17.7 percent based on a 2-yr avg. 2000-2001 OR
17.9 percent based on a 2-yr avg. 2001-2002 OR
17.9 percent in 2002 OR
A correct retrieval for New Mexico poverty rate from American Factfinder (AFF)

6. How many poor children live in mother-only families?

Correct answer: 6,353,000 in 2001 (or 39.3 percent) OR
6,126,000 in 2000 (or 39.7 percent) OR
Comment that these are female-householder, not mother-only,
and find one of the numbers above as next closest thing.

* *

Poverty Questions for the Table Finder Prototype

1. Find the number of people who are poor in the U.S.

Correct answer: 34.6 million in 2002 (34,570)

32.9 million in 2001 (32,907)
31.1 million in 2000

2. Find the poverty rate for Hispanics.

Correct answer: 21.8 (2002) or
21.4 (2001) or
21.2 (2000)

3. Does the Census Bureau's poverty definition take into account geographic variation in the cost of living?

Correct answer: no. OR
Yes but you must indicate that the measures are experimental

4. How many dollars a year does it take to be considered poor?

Correct answer: any of the 48 dollar amounts in the threshold matrix. Not just one number. Should say $x thousand for a family of ___.

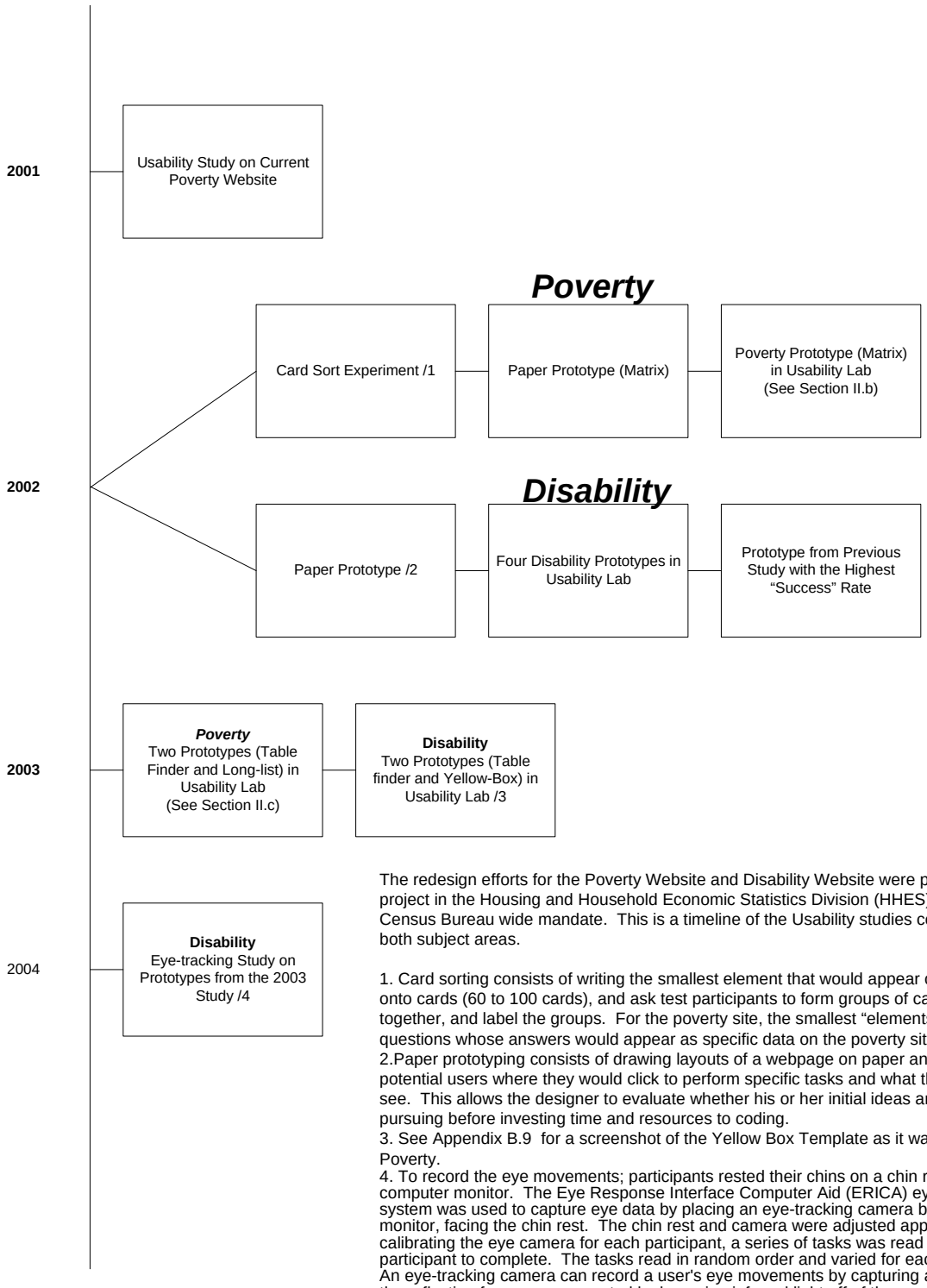
5. What was the poverty rate for children in Maryland? (use the most current information you can find)

Correct answer: Table 25 – can use related children, people under 18, or related children under 18 for either 2000, 2001, or 2002 (table POV46 in 2002)

6. How many people age 65 and over live in married-couple families and are poor?

Correct answer: 828,000 or 4.3 percent for 2001 OR
984,000 or 5.1 percent for 2002 OR
823,000 or 4.4 percent for 2000

Appendix C: Usability Studies Timeline



The redesign efforts for the Poverty Website and Disability Website were part of a pilot project in the Housing and Household Economic Statistics Division (HHES) and were not a Census Bureau wide mandate. This is a timeline of the Usability studies conducted for both subject areas.

1. Card sorting consists of writing the smallest element that would appear on the website onto cards (60 to 100 cards), and ask test participants to form groups of cards that belong together, and label the groups. For the poverty site, the smallest "elements" were questions whose answers would appear as specific data on the poverty site.
2.Paper prototyping consists of drawing layouts of a webpage on paper and asking potential users where they would click to perform specific tasks and what they expected to see. This allows the designer to evaluate whether his or her initial ideas are worth pursuing before investing time and resources to coding.
3. See Appendix B.9 for a screenshot of the Yellow Box Template as it was applied to Poverty.
4. To record the eye movements; participants rested their chins on a chin rest facing the computer monitor. The Eye Response Interface Computer Aid (ERICA) eye tracking system was used to capture eye data by placing an eye-tracking camera below the monitor, facing the chin rest. The chin rest and camera were adjusted appropriately. After calibrating the eye camera for each participant, a series of tasks was read for the participant to complete. The tasks read in random order and varied for each participant. An eye-tracking camera can record a user's eye movements by capturing and following the reflection from an eye, created by bouncing infrared light off of the eye. Eye tracking can be used to examine web visual paths, locations of fixations, and fixation times. This data can in turn determine areas of interest on a screen, optimal information layouts, and aesthetic appeal.