STATISTICAL COMMISSION and　　　　　　　　　　　Working Paper No. 27
ECONOMIC COMMISSION FOR EUROPE　　　　　　English only

CONFERENCE OF EUROPEAN STATISTICIANS

Joint UNECE/EUROSTAT Work Session on Electronic Data Reporting
(Geneva, Switzerland, 13-15 February 2002)

Topic (i): Management, organisational and policy issues

THE EVOLUTION OF WEB DATA COLLECTION AT THE U. S. CENSUS BUREAU - FROM RESEARCH TO PRODUCTION

Submitted by United States Bureau of the Census[1]

Contributed paper

ABSTRACT

The advent and exponential growth of the World Wide Web (Web) offers the U. S. Census Bureau an efficient and increasingly popular medium for collecting data about American society. In response to this, work began in 1996 to research, develop, and test the Web Computerized Self-Administered Questionnaire (CSAQ) technology.

A CSAQ is an electronic rendering of a questionnaire that controls the flow of survey questions, provides help screens, and performs consistency and completeness edits on data as the respondent completes the questionnaire. Depending on the type of CSAQ, it can be sent with pre-loaded respondent-specific data and include data importing/exporting functionality, printing features, and the automatic transmission of data to the Census Bureau (modem, Web).

When the diskette CSAQ was first proposed at the Census Bureau in 1992, several benefits were anticipated. These included better quality data, reduced respondent burden, quicker survey timing, and cost savings to the Census Bureau. Later, in addition to these initially anticipated benefits, certain overriding external reasons are forcing the implementation of the Web CSAQ reporting option across all Census Bureau surveys.

In 1992, the Computer Assisted Survey Research Office (CASRO) was formed at the Census Bureau. The mission of this office is to implement Computer-Assisted Survey Information Collection (CASIC) methods in Census Bureau data collection and processing in an expeditious, coordinated, and cost-effective manner. Over a period of several years, CASRO has developed and implemented Web CSAQs for 15 surveys. Much was learned with each of these Web CSAQ research projects. However, at this point, most Web CSAQ projects have become a routine production of similar Web CSAQs performed on a tested and proven system. It is time to find a production home for Web CSAQ outside of CASRO's research environment.

It would introduce coverage bias if a survey were to use only Web CSAQ for data collection.   Not only does the respondent need access to the Web to complete the Web CSAQ, but they also need to be willing to use the Web to report. Some respondents have fears about the security of their data on the Web, while others don't understand the Web CSAQ functionality.   Consequently, any survey manager considering the use of Web CSAQ must do so in a multi-modal survey design. However, with a multi-modal design,

---

[1]　　　　Prepared by Barbara Sedivi Gaul.

GE.01-

the fact that we are creating, distributing, and processing both a Web CSAQ and a paper questionnaire, and in some cases even a diskette CSAQ, adds to the cost and time to conduct the survey.

The Census Bureau set out to find software that would create Web CSAQ instruments as well as paper questionnaires and diskette CSAQ instruments concurrently. In preparation for the 2002 Economic Census just such a product is being developed, the Generalized Instrument Design System (GIDS). The key design goal of GIDS is to differentiate between content and layout. Content represents the questions and answer areas that comprise a survey. Layout represents those questions formatted for a specific mode. Distinguishing between content and layout permits reusing the same content in different layouts.

Due to the growing demand for Web CSAQs and especially the plans to use Web CSAQ in the 2002 Economic Census, CASRO's current Web CSAQ system is no longer considered appropriate or capable of handling the Bureau-wide needs. Consequently, the Census Bureau is in the process of creating an expanded and institutionally supported Web CSAQ Production System to continue the effective development and implementation of Web CSAQs.

I.   INTRODUCTION

1.   The advent and exponential growth of the World Wide Web (Web) offers the U. S. Census Bureau an efficient and increasingly popular medium for collecting data about American society. Indeed, the pervasive presence and convenience of the Web has generated a demand and general expectation for electronic or Web-based alternatives to paper questionnaires. In response to this, work began in 1996 to research, develop, and test the Web Computerized Self-Administered Questionnaire (CSAQ) technology. This paper lists our reasons for developing Web CSAQ, the history of that research, both obstacles and solutions to integrating Web CSAQ with our existing data collection methods, and our steps in organization restructuring to accommodate this new technology.

II.   CSAQ DEFINITION

2.   A CSAQ is an electronic rendering of a questionnaire that controls the flow of survey questions, provides help screens, and performs consistency and completeness edits on data as the respondent completes the questionnaire. Depending on the type of CSAQ, it can be sent with pre-loaded respondent-specific data and include data importing/exporting functionality, printing features, and the automatic transmission of data to the Census Bureau (modem, Web). The Census Bureau has developed two methods of distributing CSAQs to respondents, by mailed 3.5" diskettes and by the Web (Ramos, Sedivi, and Sweet 1998).

III.   WEB CSAQ TYPES

3.   Two types of Web CSAQs have evolved consistent with the needs of the respondent and the particular data collection effort. The first type is an interactive (on-line) form that respondents access simply by entering a specified Uniform Resource Locator (URL) in their Web browsers. The Web form is displayed and functions within the restrictions of the respondent's browser software.

4.   The second type is an (off-line) executable program respondents access by linking to a specified URL, downloading an installation file and installing the software on their system. The Web browser serves only as a "delivery" mechanism for the CSAQ. Again, the decision to create an executable or browser dependent CSAQ is determined in part by the type of data collection. For instance, most of the Census Bureau's business surveys require data per establishment. In order to facilitate the reporting of this data, the executable CSAQ reporting option is offered with importing/exporting functionality. Smaller, less time intensive surveys are better suited to the interactive, on-line CSAQ (Kanarek and Sedivi 2000).

IV.   REASONS FOR WEB CSAQS

IV.1   Initial Internal Reasons

5.   When the diskette CSAQ was first proposed at the Census Bureau in 1992, several benefits were anticipated. These included better quality data, reduced respondent burden, quicker survey timing, and cost savings to the Census Bureau. Better quality data results from built-in edits, which prompt the respondent to resolve keying errors as they are made or explain data anomalies while reporting. Automatic data fills and calculations, automatic skipping of not applicable questions, and a reduction of future telephone calls to the respondent to resolve data anomalies reduce the respondent's reporting burden. These respondent burden reduction features help the respondent to report faster and the elimination of data keying and verification and the decrease in error resolution telephone calls at the Census Bureau reduce the time needed to prepare the survey for publication. And finally, the cost to conduct a survey should decrease since the use of diskette CSAQ would decrease form printing and storage, package preparation, postal charges, telephone calls by survey analysts, data keying, and keying verification (Sedivi and Rowe 1993).

6.   With the use of Web CSAQ all of the same benefits mentioned for diskette CSAQ were also expected. Additionally, the cost benefits would be even larger since diskettes would not need to be prepared, packaged, and mailed. Timing would be better because data transfer on the Web can be done in seconds as opposed to days through the postal system. With such a large array of benefits, pilot testing of the Web CSAQ technology proceeded in full force.

IV.2   Later External Reasons

7.   Later, in addition to these initially anticipated benefits, certain overriding external reasons are forcing the implementation of the Web CSAQ reporting option across all Census Bureau surveys:

8.   Respondents have indicated the desire for a Web CSAQ reporting option. This demand has been indicated through screener questionnaires, diskette and Web CSAQ evaluation questionnaire responses, telephone calls, company visits, and email messages. By giving attention to public needs and concerns, we improve the public's perception of the Census Bureau and increase public cooperation with our censuses and surveys.

9.   Compliance with U. S. Federal mandates. Two U. S. Federal mandates are promoting the use of electronic data collection: he Paperwork Reduction Act of 1995 and the Government Paperwork Elimination Act (GPEA) of 1998. The Paperwork Reduction Act seeks to minimize the paperwork burden for individuals, small businesses, educational and nonprofit institutions, Federal contractors, State, local, and tribal governments resulting from the collection of information by or for the Federal Government. In addition, it states that with respect to the collection of information, agencies must to the maximum extent practicable, use information technology to reduce burden and improve data quality, agency efficiency and responsiveness to the public.

10.   The Government Paperwork Elimination Act (GPEA) requires U. S. Federal agencies to allow individuals or entities that deal with the agencies the option to submit information and to maintain records electronically, when feasible. This capability should be in place at each agency by October 21, 2003.

11.   In compliance with these mandates, a strategic objective of the Economic Directorate of the Census Bureau is to reduce the reporting burden its censuses and surveys impose on the public. The aggressive implementation of Web CSAQ reporting options demonstrates to the business community and the American public the pro-active nature of our efforts to reduce their reporting burden. For the business community, this is most evident in the ability of corporations to import large amounts of data into the Web CSAQ and then automatically transmit this to the Census Bureau.

12.   The Web is becoming the preferred mode of communication. The proliferation of Web use in America is constantly growing both on an individual and business level.   The development and implementation of Web CSAQ technology aligns the Census Bureau's data collection efforts with this emerging trend.   In the business community, the drive is to "Web-enable" their communication and interaction with business partners and customers. This means the transition of business processes and computer infrastructures to a Web-centric model. Accordingly, the Census Bureau's implementation of Web CSAQ data collection technology is, and will increasingly become, consistent with the record keeping practices of business respondents. Also, with respect to household surveys, the option to perform more activities on-line from one's home generates an expectation for a convenient Web-based alternative for interacting with the Federal Government.

V.   HISTORY OF WEB CSAQ RESEARCH

V.1   Computer-Assisted Survey Research Office

13.   In 1992 the Computer Assisted Survey Research Office (CASRO) was formed at the Census Bureau. The mission of this office is to implement Computer-Assisted Survey Information Collection (CASIC) methods in Census Bureau data collection and processing in an expeditious, coordinated, and cost-effective manner. To do this, CASRO tests available technologies as soon as possible in appropriate and coordinated ways so that informed decisions, related to inclusion of each technology in the CASIC program, can be made.   Once CASIC activities are tested and approved, CASRO makes recommendations on funding, the location of CASIC equipment and staff, and organization restructuring to facilitate this new technology.

V.2   Web CSAQ Research in CASRO

14.   Over a period of several years, CASRO has developed and implemented Web CSAQs for 15 surveys. This section lists briefly the goals and results of this Web CSAQ research. Sedivi, Nichols, and Kanarek (2000) describe in more detail the early Web CSAQ pilot tests.

15.   The majority of the Web CSAQs have been for establishment surveys, but two were household surveys. The first few, 1996 Survey of Industrial Research and Development (R&D), 1998 Company Organization Survey (COS), and 1998 field test and 1999 production Library Media Center Survey (LMC), were performed purely as a test to see if the respondents would use the Web CSAQ to report. With the success of these and the positive feedback from the respondents, a Web CSAQ for the COS has been conducted every year since then and the number of Web CSAQ COS respondents has increased to over half of the total survey establishments (Nichols and Sedivi 1998; Zukerberg, Nichols, and Tedesco 1999).

16.   With this earlier testing, we had already proven the feasibility of creating Web CSAQs that respondents would use. However, we still had some additional questions about Web CSAQ that needed to be answered. First, was there a better way to provide data security than merely the use of user names and passwords for authentication? In May 2000, we implemented a Web CSAQ for the Manufacturers' Shipments, Inventories, and Orders Survey (M3) using digital certificates. We planned to use the digital certificates for authentication and encrypted email.   The certificates worked reasonably well for authentication, but we decided not to implement certificates for encrypted email due to software compatibility issues and ease of use considerations. Our research showed that most respondents are not yet familiar with using digital certificates. An example is that most respondents did not save or export their certificates and we periodically needed to replace certificates when they received a new computer. We found that digital certificates added both cost and administrative burden (Sedivi, Nichols, and Kanarek 2000).

17.   Also in 2000, we created a Web CSAQ for the 1999 Annual Survey of Manufacturers (ASM) Supplement Survey of Computer Network Use (E-Commerce). The Web CSAQ for the E-Commerce

survey was offered to 48,000 respondents. This was larger than any other Web CSAQ survey that we had conducted up to that point. The purpose of this test was to see if our Web CSAQ system was scalable enough to handle a survey of that size. The loading of the cases into our database proved to be quite slow but the system eventually handled the survey well. The Web response rate of 24 percent for the 1999 E-Commerce survey was better than any other Web CSAQ up to that time. Therefore, a similar study is being conducted currently for the Survey of Computer Network Use, a supplement to the 2000 ASM. Only 60 days into the data collection, the Web response rate is 37 percent. This already surpasses the previous year's final Web response rate of 24 percent.

18.   The next test was with the Quarterly Financial Report (QFR) in the fall of 2000. This survey provided a slight twist in the implementation of the Web CSAQ. Here the respondents received the electronic questionnaire as a diskette CSAQ. Once it was completed, respondents were able to connect to our Web site and upload their response data. The test respondents found this useful and this diskette/Web CSAQ is being offered now to about 12 percent of the entire QFR panel.

19.   Up to this point, all of the tests were on establishment surveys. At the end of 2000, we conducted a household survey, the American Community Survey (ACS), with a Web CSAQ option (Griffin, Fischer, and Morgan 2001). At the beginning of 2001, we selected a sample from the Methods Panel Survey of Income and Program Participation (MPSIPP). This sample became the MPWeb panel, which was used to specifically test the feasibility of collecting demographic survey data on the Web. Another added benefit of the MPWeb test was that we had a chance to test a new authoring package, Macromedia Flash version 4 (Griffin and Holbert 2001). Our next Web CSAQ request came from a survey sponsor, Bureau of Justice Statistics (BJS). They requested a Web CSAQ for their National Prisoner Statistics (NPS) for release in early 2001. One requirement presented by BJS was that the NPS Web CSAQ must be accessible by the disabled. To do this, we had to implement a variation of our method of presenting on-line edits. NPS Web CSAQs were a success and the sponsor, BJS, requested that we conduct these again in 2002 and that we create a similar Web CSAQ for another NPS survey. These are being developed and will be fielded in December 2001.

20.   The National Center for Education Statistics, the sponsor of one of our earlier Web CSAQs for the LMC survey, again asked us to create a Web CSAQ. This time it was for their Private School Survey (PSS). The main knowledge acquired from this test was related to user interface design. Several rounds of usability testing were conducted on the PSS Web CSAQ and many changes were made to it as a result of these tests. The PSS Web CSAQ has been placed in production and will continue until June 2002. This will be the final Web CSAQ developed and implemented by CASRO. At this point, most Web CSAQ projects have become a routine production of similar Web CSAQs performed on a tested and proven system. It is time to find a production home for Web CSAQ outside of CASRO=s research environment.

VI.   INTEGRATION WITH OTHER DATA COLLECTION METHODS

VI.1   Coverage

21.   Coverage error is a major concern for Web CSAQ since it requires that the respondent must be both willing and able to report by the Web. Around the time that we first started considering development of Web CSAQ, in 1994 the Times Mirror Center estimated that only about 6 percent of U. S. households had e-mail or Web access (Ramos, Sedivi, and Sweet 1998). Recently, the National Telecommunications and Information Administration (2000) reports that in August 2000, 41.5 percent of all U. S. households had Web access. An even higher percentage of small businesses have Web access. Dun and Bradstreet (2001) reports that two-thirds of all small businesses have Web access. Additionally, not only does the respondent need access to the Web to complete a Web CSAQ but they also need to be willing to use the Web to report. With these promising figures, we see that Web access is rapidly increasing and we conclude that over time respondents have begun to feel comfortable using it. But still the majority of households and a significant number of businesses do not have Web access. So it would

still introduce coverage bias if a survey were to use only Web CSAQ for data collection. Consequently, any survey manager considering the use of Web CSAQ must do so in a multi-modal survey design.

VI.2   Respondent Preference

22.   Each respondent is unique in what motivates his/her decision to use Web CSAQ as opposed to another mode of data reporting. On the 1996 R&D Web CSAQ screener questionnaire, four percent of the respondents who had Web access did not want to respond using that mode because of security risks. But two years later, three percent of the 1998 COS diskette CSAQ evaluation respondents indicated that they did not want to use Web CSAQ because of the security risks. Each year after that, the concern over data security on the Web decreased. On the other hand, approximately 10 percent of the 1998 COS CSAQ evaluation respondents said that what they liked most about the electronic survey was that it saved time compared to filling out the typical paper form (Sedivi, Nichols, and Kanarek 2000). However, other respondents have indicated that they preferred the paper questionnaire since they could have a hard copy of the completed questionnaire and not need to complete the entire questionnaire in one session. This showed that they did not have a clear understanding of the functionality contained within the Web CSAQ, as all Web CSAQs allow printing and intermittent completion. We could attempt to educate the respondents on the safety and functionality of Web reporting, but that would still not convince all respondents to select that reporting mode. Still you have the respondents without access to the Web. It is thus evident that if we are to use Web CSAQ it must be in conjunction with some other data collection method.

VI.3   Multi-Modal Designs

23.   Throughout the history of Web CSAQ development at the Census Bureau we have used various multi-modal survey designs. The most commonly used is offering the respondent the choice of a paper questionnaire or a Web CSAQ, presenting both in the initial mailing to the respondent. Another less commonly used design is to allow the respondent to choose prior to survey commencement among paper questionnaire, diskette CSAQ and Web CSAQ. In this case, the respondents are usually pre-screened to determine which mode they prefer and then they are sent the materials related to their preference through postal mail. Another variation is where the pre-screened respondent is mailed a diskette CSAQ and then they are asked to connect to our Web site to upload their reported data. For one survey, we even tested using Web CSAQ as the only reporting option. This produced an unsatisfactory response rate of 22 percent, so this will not be attempted again. Finally, for one of our establishment surveys we offered the Web CSAQ as the only option in the first mailing but 60 days later in the mailing to non-respondents, we provided a paper questionnaire along with a reminder that there was a Web CSAQ available. With these multi-modal designs, we have prevented loss of coverage due to what ever could be keeping the respondent from using the Web CSAQ. However, the fact that we are creating, distributing, and processing both a Web CSAQ and a paper questionnaire, and in some cases even a diskette CSAQ, adds to the cost and time to conduct the survey.

VI.4   Generalized Instrument Design System (GIDS)

24.   To address the increased cost of a multi-modal survey design, CASRO set out to find software that would create Web CSAQ instruments as well as paper questionnaires and diskette CSAQ instruments concurrently. A couple of products that promised to do this were tested and found unsatisfactory. However, in preparation for the 2002 Economic Census a contractor is developing such a product for the Census Bureau's Economic Directorate. This is called the Generalized Instrument Design System (GIDS).

25.   Approximately 600 different survey forms need to be prepared for the 2002 Economic Census data collection. To reduce the respondent's reporting burden by offering the CSAQ benefits of importing, built-in edits, automatic calculations, and skipping of not applicable questions, CSAQs, as well as paper questionnaires, are planned for each of these 600 form types. To create unintegrated

multiple modes of data collection for each of these 600 forms would be an impossible task. But GIDS will make it easier in comparison for the survey analyst to design these forms.

26.   These Web CSAQs for the Economic Census will be GIDS-produced executable applications that the respondent downloads to their local system along with the appropriate forms and pre-listed data unique to that respondent. The Economic Directorate of the Census Bureau also conducts monthly, quarterly, and annual surveys. For these surveys, after the 2002 Economic Census, the plan is to use GIDS for the creation of interactive and executable Web CSAQs. The interactive Web CSAQs may be HTML/JavaScript forms, or a GIDS developed Plug-in application to be used for completing the forms within a browser.

27.   Through interaction with the Economic Metadata Repository (EMR), GIDS will produce paper and electronic forms from the same content metadata and re-use as much content and layout metadata as possible. The content in the EMR will be standardized across all 600 Economic Census forms as much as possible but will allow for survey specific content. Up to this point, all Web CSAQs have been custom coded using either HTML/JavaScript, XML/JAVA, Macromedia Flash, or Delphi; and paper forms have been developed using a proprietary system that produces either negatives for commercial printer or PostScript files for our DocuPrint machines. This required duplication of effort in that the content had to be created separately for each mode (paper, diskette, executable Web, or interactive Web). It also introduced the chance of discrepancies between the content found in different modes. However, the key design goal of GIDS is to differentiate between content and layout. Content represents the questions and answer areas that comprise a survey. Layout represents those questions formatted for a specific mode. Distinguishing between content and layout permits reusing the same content in different layouts.

VII.   ORGANIZATION RESTRUCTURING

28.   To respond to the growing interest in electronic data reporting, several staffs have been formed at the Census Bureau over the last decade. As mentioned earlier, CASRO was created in 1992 initially to handle the increased demand for Computer Assisted Telephone Interviewing (CATI) and Computer Assisted Personal Interviewing (CAPI). But, once formed, other CASIC technologies were added to the staff's agenda. Among these was diskette CSAQ and later Web CSAQ. At the same time a staff was established in the Economic Directorate of the Census Bureau. This staff is called the Electronic Reporting Branch (ERB) and is located in the Economic Planning and Coordination Division (EPCD). Their task is to develop electronic reporting for the Economic surveys and Census. Initially, they focused on Electronic Data Interchange (EDI) as the primary means of electronic data reporting. However, establishments were reluctant to spend the time to program their data into the EDI format. When CASRO began to work with the ERB to develop diskette CSAQ, they found that their respondents welcomed CSAQ as a method of reporting. Later, Web CSAQ also proved to be a success. With these proven technologies, the Economic Directorate decided to use CSAQ for their 2002 Economic Census. To aid this effort, in 1999 a programming counterpart of the ERB was formed in the Economic Statistical Methods and Programming Division (ESMPD) to provide technical expertise. Gradually, through the years of Web CSAQ development, CSAQ management and technical knowledge has flowed from CASRO to these two Economic Directorate branches.

29.   In the meantime, after CATI and CAPI research within CASRO was finished, a Technologies Management Office (TMO) was established in 1995. This office took on all of the tasks associated with CATI and CAPI, such as managing the projects, gathering requirements, authoring the CATI and CAPI instruments, creating and maintaining the case management system, purchasing and maintaining the hardware, installing the software, and producing the data and status reports. Basically, this centralized TMO staff handles all activities associated with CATI and CAPI for the entire Census Bureau.

30.   The Demographic Directorate of the Census Bureau was slower in embracing CSAQ data collection. They conduct both household and institution (education, state, local and tribal government) surveys. CASRO developed and implemented several successful Web CSAQs for their institutional

surveys. These were all sponsored by other Federal agencies, such as National Center for Education Statistics and Bureau of Justice Statistics, who requested the use of Web CSAQ for their data collection. However, only two household surveys have utilized Web CSAQ. Both of these had a very low Web response rate. For one of these, the American Community survey, just offering a Web option appeared to decrease the overall response rate of the survey (Griffin, Fischer, and Morgan 2001). With these results, the Demographic Directorate is not anxious to develop more Web CSAQs for household surveys. However, this does not necessarily stop the outside sponsors from requesting and paying for Web CSAQ development for their surveys. Therefore, although on a more limited scale than the Economic Directorate, the Demographic Directorate needs to be prepared to provide Web CSAQs.

31.　　Unfortunately, the Demographic Directorate has not established an Electronic Reporting Branch. During the development of all past Web CSAQs for the Demographic Directorate, CASRO has worked directly with the individual survey manager and programmers. This produced favorable results. Since there were no overwhelmingly large plans for Web CSAQ in their future, comparable to the Economic Census, this appeared to be adequate. However, now that CASRO is ready to transition Web CSAQ into a production environment, there is no centralized staff in the Demographic Directorate that is prepared to take on the task.

VIII.　WEB CSAQ TRANSITION TO FULL PRODUCTION

32.　　The Web CSAQ system that was originally established within CASRO for research purposes has grown into a production environment through which the Census Bureau implements most of their Web CSAQs. But due to the growing demand for Web CSAQs, and especially the plans to use Web CSAQ in the 2002 Economic Census, CASRO's current Web CSAQ system is no longer considered appropriate or capable of handling the Bureau-wide needs. Consequently, the creation of an expanded and institutionally supported Web CSAQ Production System (WCPS) is necessary to continue the effective development and implementation of Web CSAQs.

33.　　Not only is the impending increase in Web CSAQs a motivating factor in forming the WCPS but also the current Web CSAQ system needs to be updated. The Web CSAQ research system was built in 1997. Since that time there have been several technological improvements related to the system design. One of these is that there is now an off-the-shelf security package that does what we do in our custom-coded original Web CSAQ security software. Using and maintaining an off-the-shelf security product would be more cost-effective and efficient than continuing to use our custom-coded software. Therefore, to take advantage of this and other technological improvements that have appeared since 1997, the current Web CSAQ system needs to be reviewed and modernized.

34.　　With these fast approaching needs in mind, CASRO prepared a document to layout the plans to move the Web CSAQ from research to production. This document is called the Web CSAQ Transition Plan. The first draft of this was completed in September 2000. The transition to a WCPS is envisioned to include the creation or augmentation of staffs dedicated to Web CSAQ creation and management, as well as the construction of a secure and scalable computing infrastructure. Although the WCPS will draw from the expertise of various groups within the Census Bureau, the Transition Plan describes five staffs that would make up the core working groups of the WCPS. The five WCPS staffs are listed below.

35.　　Survey Management and Authoring Staffs - There will be two staffs performing this function: one in the Economic Directorate and the other in the Demographic Directorate. These staffs will be charged with oversight of the entire WCPS process for their respective areas. They will create Web CSAQs, coordinate efforts between survey experts and the technologists needed to implement Web CSAQs, and provide overall direction for planning and budgeting. In addition, these staffs will be responsible for funneling all requirements/procedures from various survey sponsors to the appropriate WCPS staff.

36.   Applications Support Staff - This staff will work closely with the survey management and authoring staffs, and consist of technical personnel responsible for implementing WCPS for the entire Census Bureau. This staff will consist of computer specialists skilled in Web technology. They will not author Web CSAQs, but will develop and support the WCPS. In addition, they will ensure that all security specifications and Web standards imposed by the Census Bureau or other federal laws are met.

37.   System Support Staff - The WCPS will be a permanent sub-structure or extension of the Census Bureau's Intranet/Internet infrastructure. Management and support of the Web CSAQ hardware will be under the purview of the staff currently in charge of the Census Bureau's public and data dissemination Web infrastructure. They will perform overall Web CSAQ system administration functions.

38.   Customer Service and Support Staff - This staff will be available to survey sponsors if they need assistance in providing help desk services to the Web CSAQ community. This resource will provide technical assistance only, referring any survey data reporting problems to the appropriate experts. Based on this crucial interaction, the staff will be expected to provide feedback to the Survey Management and Authoring Staffs; helping identify problems, hone processes, and increase user satisfaction when interacting with the Census Bureau.

39.   The next step after writing the Transition Plan was to find a place to locate these staffs within the organization structure of the Census Bureau. To do this we began to meet with Divisions that we thought should take over this work. First we meet with the System Support Division (SSD), the Census Bureau's centralized Information Technology (IT) experts. We thought that all of the staffs should reside in SSD. They, however, agreed that the System Support Staff should, but they were uncertain about the others. Also, at this time, since the National Processing Center (NPC), which is our mail package preparation, data keying, CATI, and clerical processing division, had already performed the duties of the Customer Service and Support Staff for some of the surveys, we thought this would be the perfect permanent location for this staff. However, we did keep in mind the fact that many of the survey managers preferred to have their own survey analysts perform the help desk functions instead of NPC.

40.   At this point, CASRO was uncertain about where to locate the Survey Management Staff and the Applications Support Staff. So several facilitated meetings were held within CASRO to uncover some ideas. One of the more popular solutions that came out of these meetings was to place these staffs in a newly created centralized Electronic Data Reporting Office for the entire Census Bureau. However, we knew that the Census Bureau's organizational culture was not conducive to the creation of a new office. So we continued to negotiate with several Divisions to take on these duties.

41.   Ten months after the draft Transition Plan had been written, IT agreed to take on the tasks of the Applications Support Staff only if the authoring duties would be removed from that staff's list of responsibilities. With this the duties of the staffs were revamped as indicated above and the Survey Management and Authoring Staffs were split between the Economic and Demographic Directorates. The already formed ERBs in the Economic Directorate would easily assume the duties of this staff. However, the Demographic Directorate would need to determine how they would handle this. Would they form a Demographic ERB staff or contract out the work. They are currently evaluating the degree of need for a dedicated Demographic Survey Management and Authoring Staff.

IX.   CONCLUSION

42.   CASRO spent may years learning how to create and implement successful Web CSAQs. They did this in cooperation with the Economic Directorate's ERBs, numerous Census Bureau survey managers, IT's Web hardware, security, and telecommunications experts, and the cognitive laboratory's usability experts. Those that worked with CASRO in this venture carry this knowledge with them into the WCPS. It is now up to everyone, both the new and old players, to work together to produce quality Web CSAQs with the same functionality that has always been expected and to improve on that functionality by incorporating the Web security and software advances that are continually evolving.

43.	During the facilitated meetings, the group felt that the optimal solution would be to establish a new, centralized Electronic Data Reporting Office. This would have been an ideal solution in that it would prevent the development of redundant or conflicting Web CSAQ systems, would not limit the future expansion of electronic data reporting, would centralize expertise on Web and new technologies, would offer a visible and influential home for electronic data reporting research, and would provide an automatic home for the transition of future researched new technologies. However, the known difficulties in establishing new organizations within Federal government agencies thwarted this idea. Therefore, although cumbersome, we had to work within the pre-existing organization structure.

44.	The main difficulty in getting the various areas to agree to take on these new staffs was that their staffs were already stretched for time. IT resources, especially, are extremely difficult to obtain so it was not realistic to think that we could easily hire new IT experts to fill these new staff positions. Fortunately, we did have access to an IT expert who had past experience in developing the Web data collection for the United States Census 2000, a somewhat different variation of Web CSAQ. Since he recently completed this project, he was available to head the Applications and Support Staff. Once the staff leader was selected, Web CSAQ workload and timing needed to be evaluated and the number of positions for the staff needed to be determined. Once done, staff needed to be re-assigned from less needy IT areas.

45.	Now CASRO must gradually migrate the ongoing Web CSAQ work to these new staffs. Three on-going Web CSAQs and the Economic Census 2002 Web CSAQ will be transferred on a flow basis between now and June 2002. Other Web CSAQ projects will be conducted and completed by CASRO before June 2002. If this actually happens, then the transition process would have taken a total of 22 months to complete. Although change has occurred slowly, the creation of a Census Bureau Web CSAQ Production System is in sight.

46.	Web and security technologies are not stagnant. So after June 2002, CASRO will continue to be alert to new developments in Web technology, security software and requirements, and other related issues. As these come about, small Web CSAQ research projects will continue to be undertaken by the CASRO staff. Also, CASRO will continue to collaborate with the user interface design experts at the Census Bureau to contribute to the empirical knowledge on Web survey interface design. Even though we have been developing Web CSAQs since 1997, there is still much to learn and with each surge in the growth of the Web a new opportunity awaits us.

REFERENCES

Dun and Bradstreet (2001), A20th Annual Small Business Survey Reveals Eight in Ten Small Businesses Now Have Computers and Two-Thirds Have Internet Access@ web site http://www.dnb.com/about/media/press_release/1,,0-223-1012-0-1052.html.
Griffin, D. H., D. P. Fischer, and M. T. Morgan (2001), ATesting an Internet Response Option for the American Community Survey,@ U.S. Department of Commerce, U.S. Census Bureau, paper presented at the 2001 AAPOR conference, Montreal, Quebec, Canada.
Griffin, E. K. and H. C. Holbert (2001), AA Feasibility Evaluation of a Web-Based Demographic Survey,@ U.S. Department of Commerce, U.S. Census Bureau, paper presented at the 2001 AAPOR conference, Montreal, Quebec, Canada.
Kanarek, H. and B. Sedivi (2000), AInternet Data Collection at the U. S. Census Bureau,@ 1999 Federal Committee on   Statistical Methodology Research Conference: Complete Proceedings, pp. 708-717.
National Telecommunications and Information Administration (2000), AFalling through the Net: Toward Digital Inclusion@ web site http://www.ntia.doc.gov/ntiahome/fttn00.
Nichols, E. and B. Sedivi (1998), "Economic Data Collection via the Web: A Census Bureau Case Study, "Proceedings of the Survey Research Methods Section, American Statistical Association, pp. 366? 371.

Ramos, M., B. Sedivi, and E. M. Sweet (1998), Computerized self-administered questionnaires. In: M. P. Couper, R. P. Baker, J. Bethlehem, C. S. F. Clark, J. Martin, W. L. Nicholls II, & J. M. O@Reilly (eds). Computer assisted survey information collection (pp 389-408). New York: Wiley.

Sedivi, B. and E. Rowe (1993), AComputerized Self-Administered Questionnaire, Mail or Modem, Initial Technical Assessment,@ prepared for the CASIC Committee on Technology Testing, U. S. Bureau of the Census.

Sedivi, B., E. Nichols, and H. Kanarek (2000), AWeb-Based Collection of Economic Data at the U. S. Census Bureau,@ Proceedings of the Second International Conference on Establishment Surveys, American Statistical Association, pp. 459-468.

Zukerberg, A., E. Nichols, and H. Tedesco (1999), ADesigning Surveys for the Next Millennium: Internet Questionnaire Design Issues,@ U.S. Department of Commerce, U.S. Census Bureau, paper presented at the 1999 AAPOR conference, St. Pete Beach, FL.