Economic Directorate Guidelines on Questionnaire Design

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September 19, 2008

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Table of Contents

Preface

These questionnaire design guidelines represent a first attempt to consolidate and systematize “best practices” for surveys conducted by the Economic Directorate. In 2007, I wrote and presented a paper at the Third International Conference on Establishment Surveys (Montreal) as an initial effort to outline guidelines for designing questionnaires within the Economic Directorate. That paper presented guidelines that were based primarily on cognitive interview findings from testing various Economic Directorate surveys, with business survey respondents.

Following the conference, I worked with Don Dillman (Washington State University) and Leah Christian (Pew Research Center) on a manuscript that is forthcoming in the *Journal of Official Statistics*. That manuscript expanded my ICES-3 paper by linking cognitive interview findings with corresponding theoretical and experimental literature.

The guidelines presented here is an effort to continue the development of the guidelines by Dillman, Christian, and me specifically for use within the Census Bureau’s Economic Directorate. We fully expect these guidelines to be dynamic rather than static. In an era of continuing research on questionnaire design, it is our hope that they will be considered a living document, continually updated and revised with emerging research that can be applied to economic surveys.

Rebecca L. Morrison
April 29, 2008

1. Introduction

The U.S. Census Bureau has developed guidelines for designing Decennial Census questionnaires for administration to households in different survey modes (Martin *et al.*, 2007). Development of these guidelines was motivated by recognition that separate efforts to construct instruments for mail, in-person enumeration, telephone, and hand-held computers had resulted in quite different questions being asked across survey modes. The 30 guidelines were aimed at collecting equivalent information across modes (i.e., the meaning and intent of the question and response options should be consistent across modes). However, there are no guidelines for questionnaire design for the Economic Directorate's numerous questionnaires. As a result, surveys from across the Directorate sometimes have an inconsistent "look and feel," and may result in respondents not realizing that these surveys are coming from the same government entity.

Recognizing the need for consistency across surveys, the division chiefs within the Economic Directorate signed a project charter in December 2007 charging a team to create questionnaire design guidelines for the Directorate. The team was tasked with analyzing the initial draft of the guidelines -- a manuscript written by Rebecca L. Morrison (ADEP), Dr. Don Dillman (Washington State University), and Dr. Leah Christian (Pew Research Center). The team was then to propose modifications, refinements, and new guidelines as necessary. Team members included: James Burton (SSSD), Anthony Caruso (CSD), Kerstin Edwards (GOVS), M. Diane Harley (EPCD), Carlos Hough (FTD), Richard Hough (MCD), Barbara Lazirko, (SSSD), Sheila Proudfoot (EPCD), and Samantha Stokes (ADEP). Rebecca L. Morrison (ADEP) served as the team leader. This document presents the work completed by the team by the end of April 2008.

These guidelines are intended for use with self-administered questionnaires only and will not address issues related to telephone follow-up (TFU) or questionnaires designed to be interviewer administered.

The Economic Directorate joins other national statistical organizations in the effort to develop questionnaire design guidelines for economic surveys. The Australian Bureau of Statistics (Farrell, 2006) and Statistics Norway (Nøtnæs, 2006) have utilized the rapidly emerging research on how the choice of survey mode, question wording, and visual layout influence respondent answers, in order to improve the quality of responses and to encourage similarity of construction when more than one survey data collection mode is used. Redesign efforts for surveys at the Central Bureau of Statistics in the Netherlands (Snijkers, 2007), Statistics Denmark (Conrad, 2007), and the Office of National Statistics in the United Kingdom (Jones *et al.*, 2007) have similarly worked to identify questionnaire design attributes that are most effective for helping respondents complete economic surveys.

The influence of question wording on how respondents interpret the meaning of questions and the answers they report has long been recognized (Schuman and

Presser, 1981; Sudman and Bradburn, 1982). This work has significantly expanded in recent years (*e.g.*, Krosnick, 1999, Sudman *et al.,* 1996; Tourangeau *et al.,* 2000). In the last decade, new research has emerged on how the visual design of questions may change and sometimes override how respondents interpret the wording of questions. This research has provided both theories and experimental findings for understanding how different visual layouts of questions impacts respondents' answers in paper (*e.g.*, Jenkins and Dillman, 1997; Christian and Dillman, 2004; Redline *et al.*, 2003) and web (*e.g.*, Tourangeau *et al.,* 2004; Christian *et al.,* 2007) surveys.

This document contains a set of guidelines, all of them listed in Appendix A, organized under several themes. The guidelines are applicable to both paper and electronic instruments. We begin with the smaller parts of questionnaires -- the questions and answer spaces themselves -- then move on to broader issues including the organization of information on individual pages and across pages. Finally, we address the topics of instructions and completing matrices.

These guidelines are grounded in visual design theory and experimental evidence on how alternative visual layouts influence people's answers to survey questions. The guidelines are also based on research into how people read and process verbal information. They recognize the multiple mode environments in which the Economic Directorate typically collects data. Finally, many of the guidelines have been informed by evidence from dozens of cognitive interview projects with economic survey respondents conducted by the Establishment Survey Methods Staff in the Office of Statistical Methods and Research for Economic Programs. Each cognitive interview project typically involves interviewing from as few as nine to as many as seventy-five respondents.

Some readers of this document may be expecting questionnaire design standards, or a "cookbook" for questionnaire design. This document will not meet either expectation. Nor do we expect the guidelines presented here to be applied unilaterally across all surveys within the Economic Directorate. Rather, this document outlines best practices in the field, along with a discussion of the tradeoffs between optimal design, data quality, data security, and processing needs associated with questionnaire design decisions. Individuals involved with questionnaire design efforts in their survey programs should familiarize themselves with the constraints of the processing system(s) that will be used prior to designing a questionnaire. As a result, these guidelines and results from pretesting can be applied within the constraints of the system(s).

This document utilizes a large number of examples from questionnaires within the Economic Directorate, as well as questionnaires from other areas in the Census Bureau and other agencies. Examples are not intended to reflect poorly on any particular survey program. Rather, we use examples to illustrate potential improvements in questionnaire design that the guidelines address, or to illustrate design decisions that show how the guidelines could be applied.

Implementing these guidelines may increase the number of pages for a given questionnaire. Some readers may be concerned that an increase in the number of pages may negatively affect response rates. In fact, the empirical evidence that has examined this issue has not shown a consistent negative effect. Indeed, some of the research indicates that response rates were maintained. Section 3.2 cites the relevant research.

By applying these guidelines that incorporate theory and research on wording and visual design, survey designers can ultimately move from making decisions based on "what looks good to me" to "what encourages respondents to process and pay attention to what is important."

The guidelines presented here represent a beginning. These guidelines should be updated periodically as new information becomes available, either through qualitative or quantitative research methods, or as forms processing technology advances. We encourage the Directorate to implement tests or experiments to address questionnaire design issues, especially when there is potential for a large impact on a specific survey. These studies should be designed on an appropriate scale so that the results meet research goals. Additions and adjustment to the guidelines might be made as more information about how respondents process information and answer questions is obtained.

2. Background

These design guidelines are intended as recommendations for how certain kinds of questions, ranging from requests for dollar amounts to completing matrices may be effectively communicated to the Economic Directorate's economic survey respondents. We focus specifically on developing general guidelines that can be applied across the various surveys and data collection efforts across the Directorate, including surveys and censuses of establishments, kinds of business, companies, governments and the collection of import and export information. In this document, we use the term "economic surveys" to describe these various types of data collection efforts across the Directorate. Developing guidelines requires taking into account at least three distinct considerations: the influence of agency context, visual design research, and respondent perspectives. These considerations form the overall framework used for developing the proposed guidelines.

2.1 The Influence of Agency Context

Statistical agencies throughout the world exhibit quite different contexts for the development of questionnaire design guidelines. Some agencies rely mostly on paper and interview surveys. Others are moving rapidly to the Internet as their primary means of data collection, while paper versions of web instruments are often used to complement the web or for businesses that are unwilling to use the web or do not have

access to the web. For guidelines to be usable across a variety of survey contexts, they need to support the use of multiple modes of data collection, such as the guidelines written by the Australian Bureau of Statistics (Farrell, 2006).

In economic surveys, where surveys may need to be completed by multiple respondents or the release of data may require approval by the organization, paper forms or printouts of web questionnaires are frequently used to support the preliminary process of identifying what information needs to be compiled for reporting, and preparing preliminary drafts that will be reported electronically (Snijkers, 2007; Dowling, 2006). Respondents often use paper forms as rough drafts before attempting to enter the data and answer the sequence of questions on multiple topics that appear on successive screens of a web survey. In addition, many establishments need to keep records of the survey response for organizational needs or to assist them in completing future surveys when they are repeated over time. Thus, our effort to develop guidelines is further shaped by the importance of constructing comparable questionnaires for both mail and web surveys.

The guidelines proposed in this paper reflect the heterogeneous design environment of the U.S. Census Bureau where economic surveys are constructed in the following ways:

- Many Economic Directorate paper questionnaires are developed uniquely for a particular survey, and are constructed by forms designers located within the Administrative and Customer Service Division or the National Processing Center. Forms designers attempt to respond to the needs and preferences of individuals who oversee the survey.
- In addition to paper, some economic surveys are conducted on the web. Several of these surveys use an in-house system called Census Taker. This system has been developed to follow set standards in a way that encourages similarity in construction and data collection processes for all Census Bureau economic surveys. Another alternative for collecting data over the Internet is Harvester, which is a system developed by Governments Division. Harvester has many built-in editing capabilities and is able to design electronic forms that look very similar to their paper counterparts. Both Census Taker and Harvester allow respondents to enter data via the Internet, without having to download any additional files or software.
- The Economic Census and a few other economic surveys are designed using the Questionnaire User Interface and the Generalized Instrument Design System (QUI-GIDS). The system was initially developed for the 2002 Economic Census and its approximately 550 industry-specific questionnaires. It uses the same content (questions and related materials) from a metadata repository to build both paper and electronic questionnaires. Electronic questionnaires are provided to respondents via Surveyor, executable software that is downloaded onto a respondent's computer. Building questionnaires using QUI-GIDS has two distinct advantages: the paper instruments are ready for key-from-image (KFI) data capture, and the electronic instruments have many built-in edit capabilities. However, the system is designed to follow Economic Census and KFI standards and thus does not provide much flexibility to customize forms design.

The guidelines contained within this document were written broadly enough to be used for each construction method currently utilized by the Economic Directorate.

2.2 Relevant Research

Words are the primary means of communication used to convey information in a survey. Thus, to develop these guidelines, wording principles from many different sources, *e.g.*, Sudman *et al.* (1996), and Dillman (2000) are applied. Respondents also draw information from graphical features through their interpretation of numbers, symbols (such as arrows), as well as boldness, spacing, contrast, and other features of questionnaire construction (*e.g.*, Jenkins and Dillman, 1997; Redline and Dillman, 2002).

The development of guidelines for constructing the Census Bureau's economic surveys is heavily influenced by this expanding body of visual design research that shows when, why, and how people are influenced by visual characteristics of written information. Although research on the effects of visual design and layout in government surveys has appeared occasionally in the literature (*e.g.*, Wright and Barnard, 1975; Smith, 1995), it is only during the last decade that systematic experiments have shown how and why visual layout and design makes a difference in the interpretation of survey questions and matrices, the use of instructions, and the display of response options and answer spaces.

For the most part, these experiments have been guided by theoretical developments in how individuals see and process visual information, *e.g.*, Palmer (1999), Hoffman (1998) and Ware (2004), which help to provide an understanding of why some visual formats work better than others to obtain accurate information from respondents. In addition, researchers have drawn from Gestalt psychology to interpret their empirical observations, *e.g.*, Jenkins and Dillman, 1997. Ware (2004) describes the Gestalt psychologists from the early twentieth century as researchers who "provided a clear description of many basic perceptual phenomena" and developed several "rules that describe the way we see patterns in visual displays" (p. 189). Three Gestalt principles are particularly relevant for the questionnaire design guidelines we have developed:

- The principle of proximity: objects that are closer together tend to be seen as belonging together,
- The principle of similarity: objects that are similar in font, color, size, or other characteristics tend to be seen as belonging together, and
- The principle of pragnanz (hereafter referred to as the principle of simplicity): simpler objects are easier to perceive and remember.

2.3 Respondent Perspectives

Economic surveys are completed by individuals whose perception and interpretation of questions are clearly affected by the wording and visual design principles mentioned above. However, it is also important to recognize that respondents to these surveys tend not to be answering questions for themselves as individuals, but as representatives of their businesses. Because of the emphasis on numerical and business transaction information in economic surveys, many respondents have accounting or other backgrounds so they are generally comfortable working with tables, matrices, and numerical information. This may result in question formats that might be problematic for surveys of individuals or households, but not for establishments.

For this reason, the evaluation of the process of filling out questionnaires is a consideration in the development of these questionnaire guidelines. Cognitive interviews with members of populations about to be surveyed have evolved as a powerful technique for improving survey design (*e.g.*, Gower, 1994; Presser *et al*., 2004). Cognitive interviewing has therefore been extensively used to test proposed question formats and provide additional evaluation of the guidelines presented here. These interviews are used to both suggest and evaluate refinements to principles derived from the published experimental research mentioned above. Thus, results from cognitive interviews constitute a third set of information used to provide a basis for these questionnaire design guidelines that is critical for evaluating the effects of specific wording and visual layout.

In summary, these design guidelines link the rapidly growing theory and research on how wording and visual layout influence respondents to results from cognitive interviews that evaluate how the actual target population to be surveyed responds to proposed questionnaire formats. Both of these considerations are in turn affected by the agency context and the use of multiple survey modes and questionnaire construction methods. The development of these guidelines involved a careful triangulation of these distinct but individually important issues that improve data quality.

3. Guidelines on Wording

Good visual design will not fix a poorly written question, and a well-written question can be misinterpreted or ignored due to bad visual design. Furthermore, words are the primary ways of communicating to respondents what data are being requested. Therefore, we focus our attention first on wording. Since there is a well-developed literature on question wording, analysts with questionnaire design responsibilities are advised to refer to standard textbooks, such as Converse and Presser (1986), Fowler (1995), Mangione (1995), and Dillman (2000) for principles of question wording. In addition to these basic principles, we propose the following two guidelines.

3.1 Phrase data requests as questions or imperative statements, not sentence fragments or keywords.

Typically, economic surveys request information in one of three ways: questions, imperative statements, or sentence fragments. Questions are sentences with a question word (*e.g.*, when, how many, which) and a question mark at the end. With imperative statements the subject ("you") is implied and a command or request is expressed. Sentence fragments consist of a keyword or series of keywords without a verb or punctuation.
The 2002 Economic Census, collected by the U.S. Census Bureau, used both questions and sentence fragments for the data requests. Line 3B used a question ("Is this establishment physically located inside the legal boundaries of the city, town, village, etc.?") while Line 3C used a sentence fragment ("Type of municipality where this establishment is physically located").

Sometimes, the form that the intended answer is supposed to take is not adequately communicated using sentence fragments. Complete sentences help respondents determine what type of information is required without having to refer to other sources of information such as instructions (Dillman, 2007). When rules were developed for converting the USDA's Agricultural Resource Management Survey questionnaire from interviewer-administered to self-administered, Rule 5 emphasized converting sentence fragments used throughout the questionnaire to complete sentences that could stand alone (Dillman *et al.,* 2005). Research by Tourangeau (2007) shows, based upon multiple experiments on web surveys, that respondents tend not to go to separate instructions. Additionally, the more difficult it is to access the instructions, the less likely it is that they will be used. Writing complete sentences is important in reducing the need for separate instructions. Please see Section 7 for additional information and guidelines regarding instructions.

Gernsbacher (1990) conducted multiple experiments that explored how people read words, sentences, and paragraphs. Her research demonstrated that people "spend more cognitive capacity processing initial words and initial sentences than later-occurring words and later-occurring sentences" (p. 9). The initial words lay the foundation for comprehending the remainder of the sentence. After processing the initial words, readers attach each new piece of information to the foundation, and build a structure to comprehend. A question word at the beginning of a sentence implies to the reader that a response is expected. However, a sentence fragment often does not adequately convey what type of answer is expected.

Though questions and imperative statements are more effective than sentence fragments, cognitive evaluations done by the U.S. Census Bureau suggest that respondents prefer questions over imperative statements (Morrison, 2003). Interviews with 11 business respondents to the Survey of Industrial Research & Development addressed this issue. Respondents went through a questionnaire that employed either imperative statements or questions. Near the end of the interview, they were presented with the opposite questionnaire, and asked which version they preferred and why.

Though the sample size was small, the findings suggested that respondents preferred questions to imperative statements. They said the questions were clearer and more direct; they favored the "sentence structure" of the questions.

Converting sentence fragments into questions can be relatively easy. In the 2007 Economic Census, some fragments were converted into questions. For example, instead of using a series of keywords to get at the type of municipality in Line 3C, a question has been asked: "In what type of municipality is this establishment physically located?"

3.2 Break down complex questions into a series of simple questions.

Asking additional, simple questions is preferable to asking fewer, more complicated ones. Cognitive burden is reduced by making the task easier and less time-consuming. Cognitive burden refers to the mental efforts required to understand a question, determine where the appropriate information can be found, judge whether or not a response is accurate, and then report that response on the survey instrument.

Gernsbacher's research (1990) indicated that sentences with a more complex structure – for example, the presence of multiple clauses – requires readers to spend more time figuring out the meaning of the sentence. Using commas in a sentence to separate clauses generally indicates to the reader that there is a change in the direction of the sentence. A change in direction requires additional time to process, due to the time needed to focus on the change and its meaning.

Tourangeau *et al.* (2000) discusses this concept in terms of the brain's working memory. Complex questions overload working memory, which leads to reduced cognitive processing ability and items being dropped from working memory. Long questions can pose difficulty for respondents for this reason. As a result, they pay more attention to some words than others (Beatty *et al.*, 2007). McCarthy and Safer (2000) found that only 15% of respondents considered all three explicitly mentioned key pieces of information when answering a question about number of cattle brought to market. Furthermore, they determined that this omission was not due to respondents' lack of understanding the terms, but was a result of not comprehending the lengthy and complex introduction. Breaking up complicated questions into several questions reduces the overall process into manageable tasks, which are individually less taxing for the working memory. This is why Dillman (2000) advises using as few words as necessary to pose a question.

Complex questions might involve multiple clauses, long lists of response options along more than one dimension, or ask about more than one concept at a time. An example of a question that asks about more than one concept at a time comes from the 2002 Survey of Industrial Research & Development. One question from this paper survey (Figure 1) attempted to elicit information about the breakdown of research and development (R&D) costs by the type of technology. It also attempted to obtain information about what percentage of that R&D was attributable to nanotechnology.

The nanotechnology part of the question, in the white column furthest to the right (labeled Column 2), was not seen by respondents. Instead, many of them thought they were supposed to convert their reported dollar costs into percentages, and the nanotechnology question above the percentage instruction was not being answered. This problem is predictable based upon the limitation in focus of people's vision to a width of 8-10 characters when attentively focused on processing information (Jenkins and Dillman, 1997). The issue is expressed slightly differently by Tourangeau *et al.* (2004) as people conforming to the heuristic of "near means related." In essence, nanotechnology is blocked from view by the more accessible request for percent. It also seemed that respondents misunderstood that the nanotechnology question was, in fact, a new question; since it was near the question concerning dollar values, respondents thought the columns were related.

Figure 1. An example of a complex question from the 2002 Survey of Industrial Research & Development Survey (RD-1)

Item 7 – COSTS INCURRED FOR RESEARCH AND DEVELOPMENT PERFORMED *WITHIN THE COMPANY* BY TECHNOLOGY AREA

Allocate the total reported in Item 3A, line 4, column (3), into the following technology areas:	Key code	2002 (1)			Percentage of R&D attributable to nano-technology (2)	2001 (3)			Percentage of R&D attributable to nano-technology (4)
	7	Bil.	Mil.	Thou.	Whole %	Bil.	Mil.	Thou.	Whole %
A. Biotechnology	11				%				
B. Software development	21				%				
C. Materials Synthesis and Processing	31				%				
D. Other technology areas not listed in 7A through 7C above.	41				%				
E. TOTAL COSTS – *Sum of lines A through D* *(This item should equal the total reported in Item 3A, line 4, column (3).)* →	51				%				

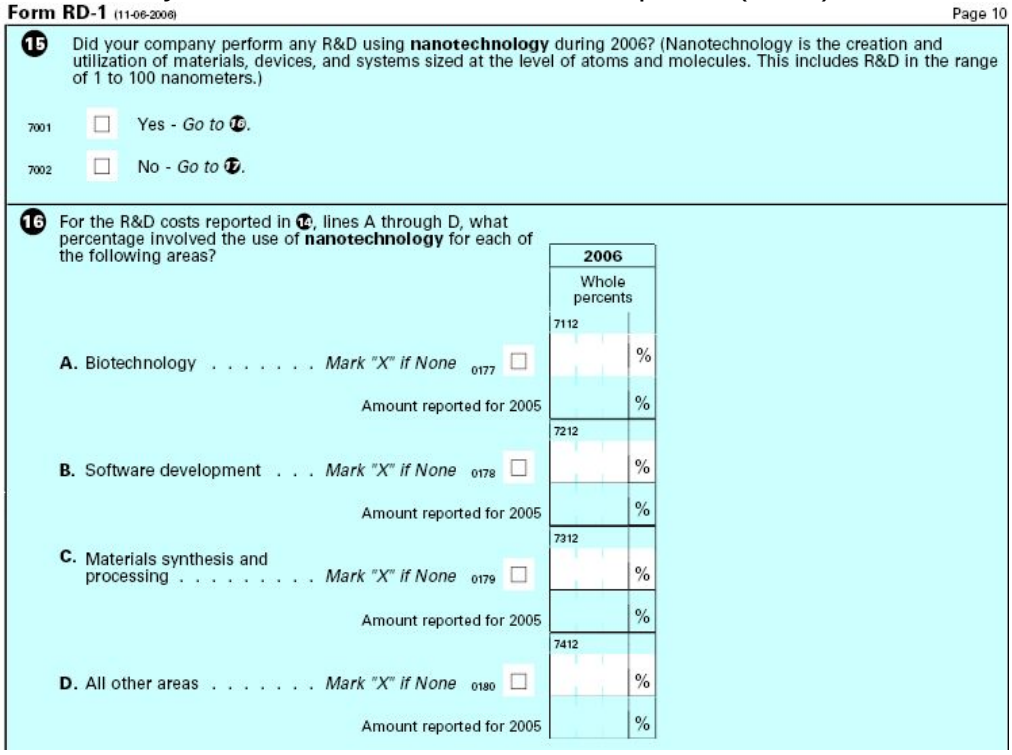
An example of a complex question with response options along more than one dimension comes from the 2002 Survey of Business Owners (SBO). The first question (Figure 2) asked respondents to select options from a list that describe the ownership of the business.

Figure 2. An example of a complex question from the 2002 Survey of Business Owners (SBO-1)

This list of options proved to be particularly difficult for respondents. It required them to think of a variety of ownership arrangements that included everything from ownership by foreign entities vs. domestic entities, the legal form of the organization, and ownership by American Indian or Alaska Native entities. Because the options were, in fact, different dimensions, they were cognitively burdensome to process. In addition, research has shown that the check-all format used for questions like the one in Figure 2 results in greater marking of earlier items and fewer overall (Smyth *et al.,* 2006; Smyth *et al.*, 2008). Consequently, the check-all format is especially prone to satisficing, a strategy in which respondents do as little work as possible to come up with an acceptable but not optimal answer (Krosnick, 1991). Thus, this format should be avoided when possible.

There are several ways to break down a complex question into a manageable set of questions. One option might be to add a filter question, as the Survey of Industrial Research and Development did in order to improve the accuracy of people's responses (see Figure 3).

Figure 3. An example of simplifying a complex question using a filter question, from the 2006 Survey of Industrial Research & Development (RD-1)



Form RD-1 (11-06-2006) Page 10

15 Did your company perform any R&D using **nanotechnology** during 2006? (Nanotechnology is the creation and utilization of materials, devices, and systems sized at the level of atoms and molecules. This includes R&D in the range of 1 to 100 nanometers.)

7001 ☐ Yes - *Go to* **16**.

7002 ☐ No - *Go to* **17**.

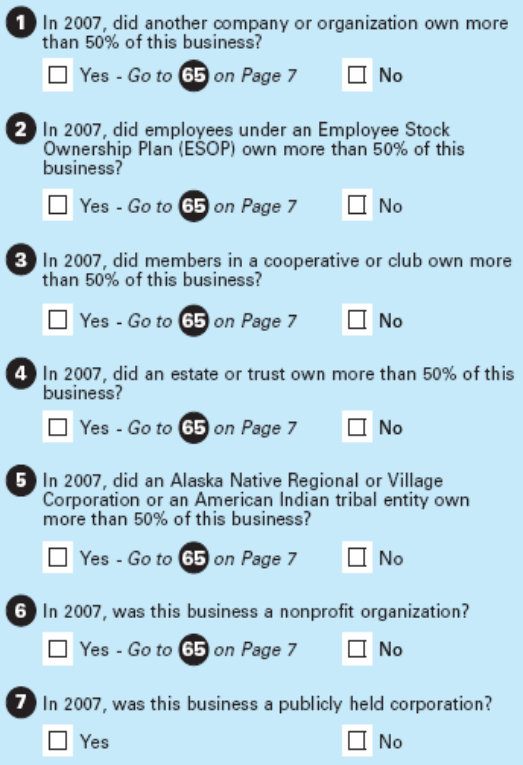
16 For the R&D costs reported in **14**, lines A through D, what percentage involved the use of **nanotechnology** for each of the following areas?

	2006 Whole percents
A. Biotechnology . . . . . *Mark "X" if None* 0177 ☐	7112 %
Amount reported for 2005	%
B. Software development . . . *Mark "X" if None* 0178 ☐	7212 %
Amount reported for 2005	%
C. Materials synthesis and processing . . . . . *Mark "X" if None* 0179 ☐	7312 %
Amount reported for 2005	%
D. All other areas . . . . . *Mark "X" if None* 0180 ☐	7412 %
Amount reported for 2005	%

In cases where the question itself is complex, the sentence may be simplified by first looking at the number of clauses and the number of times the words “and” or “or” are used. Identifying the different parts of complex questions can help when deciding how to divide the question into smaller more manageable ones.

When the response options are along more than one dimension, it may be useful to ask multiple questions that ask about each one, as was done for the 2007 Survey of Business Owners (Figure 4). Rather than ask one question about ownership, multiple questions were asked. A yes answer to each item would direct respondents to a later item. This is a format that encourages respondents to evaluate each type of ownership individually (rather than view them as a group), and not contemplate whether a later response option overlaps or differs sufficiently from an earlier marked answer to warrant being marked as well.

Figure 4. An example of simplifying a complex question using multiple simpler questions, from the 2007 Survey of Business Owners (SBO-1)



In some cases, when a complex sentence structure cannot be simplified, and a question contains several important pieces of information that must be understood in order to provide a proper answer, simple diagrams may be useful. For further guidance on the use of diagrams, refer to Section 5.3.

Dividing complex questions into smaller component pieces will likely result in a larger number of questions on a given survey. However, the cognitive effort required to read, process, and answer those questions will be reduced.

Asking more individual questions often requires additional space, which may in turn increase the number of questionnaire pages. While some might be concerned that the increase in the number of pages will negatively affect response rates, research has shown the contrary when a questionnaire's design is based on cognitive principles and pretesting (Dillman *et al*., 1993; Subar *et al*., 2001). However, adding more pages to a questionnaire might increase the costs of the mailout and return packages.

The guidelines above have addressed the issue of question wording. Theory, research and cognitive interview findings have shown that respondents are better able to respond to questions that are phrased as questions or imperative statements, and address only one topic or response dimension at a time. We now turn our attention to guidelines for visual design and layout. These guidelines have been linked together under larger themes.

4. Guidelines on the Display of Answer Spaces / Response Options

Answer spaces are very important in the questionnaire because this is where the actual response data are reported. Answer spaces and response categories can be important tools for conveying the type of information or level of detail expected. Therefore, it is especially important that answer spaces and response categories are easy for respondents to locate and visually stand out from the question, instructions, and other information in the survey.

4.1 Use white spaces against a colored background to highlight answer spaces.

When respondents are presented with visual information in the questionnaire, they quickly decide which elements to focus on (Lidwell *et al*., 2003; Ware, 2004). The Gestalt principle of simplicity suggests that visual features that are regular and simple are easier to perceive and remember. The Gestalt principle of similarity suggests that respondents are more likely to perceive the answer spaces or response categories as being related to one another if they are the same color.

To facilitate the comprehension process, answer spaces in white should be displayed against a lightly colored or shaded background for the questionnaire pages or screens (Figure 5). Since the answer spaces are smaller against a larger colored background, the answer spaces "rise" above the colored background as figures – the objects of interest – and are thus seen as more prominent. For paper questionnaires, the contrasting surrounding color also provides a visual guide that helps respondents keep answers inside the answer space. In addition, white answer boxes against colored backgrounds are especially important for use in many optical imaging and scanning systems.

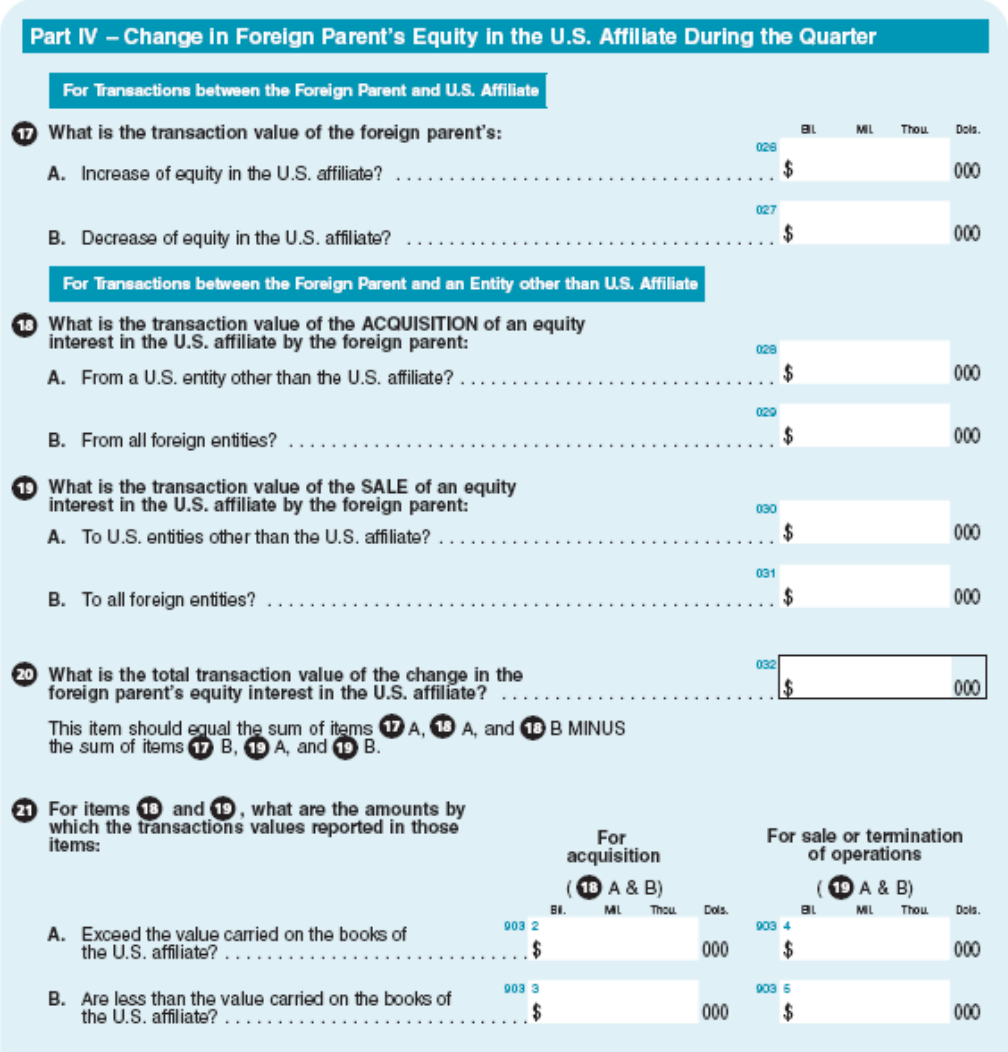
When white answer spaces are employed, there is little need to surround each answer space with lines. The visual rationale for not using these lines (as seen in Figure 5) is that the contrast between the background color and the white answer spaces is sufficient for the eye to distinguish one space from another (Dillman *et al.*, 2005). Dividing lines tend to focus visual attention on the area around answer spaces, rather than the answer spaces themselves. Therefore, it is our recommendation that they not be used, unless necessary.

Lines surrounding answer spaces may be necessary for a few reasons:

1) the questionnaire has a particularly light background color so there is not enough contrast to distinguish white answer spaces,
2) a change in action is required (for example, see Figure 5, question 20, where respondents must perform a mathematical operation using information provided earlier in the page), and
3) the questionnaire is subject to key-from-image (KFI) processing systems requirements.

The Economic Planning and Coordination Division can provide guidance on the requirements that instruments need to follow when KFI is used.

Figure 5. Example of a questionnaire without lines surrounding answer spaces, from the Bureau of Economic Analysis' revised quarterly foreign direct investment questionnaire (BE-605)



Part IV – Change in Foreign Parent's Equity in the U.S. Affiliate During the Quarter

For Transactions between the Foreign Parent and U.S. Affiliate

17 What is the transaction value of the foreign parent's: (Bil. Mil. Thou. Dols.)

A. Increase of equity in the U.S. affiliate? 026 $ 000

B. Decrease of equity in the U.S. affiliate? 027 $ 000

For Transactions between the Foreign Parent and an Entity other than U.S. Affiliate

18 What is the transaction value of the ACQUISITION of an equity interest in the U.S. affiliate by the foreign parent:

A. From a U.S. entity other than the U.S. affiliate? 028 $ 000

B. From all foreign entities? 029 $ 000

19 What is the transaction value of the SALE of an equity interest in the U.S. affiliate by the foreign parent:

A. To U.S. entities other than the U.S. affiliate? 030 $ 000

B. To all foreign entities? 031 $ 000

20 What is the total transaction value of the change in the foreign parent's equity interest in the U.S. affiliate? 032 $ 000

This item should equal the sum of items 17 A, 18 A, and 18 B MINUS the sum of items 17 B, 19 A, and 19 B.

21 For items 18 and 19, what are the amounts by which the transactions values reported in those items:

	For acquisition (18 A & B) Bil. Mil. Thou. Dols.	For sale or termination of operations (19 A & B) Bil. Mil. Thou. Dols.
A. Exceed the value carried on the books of the U.S. affiliate?	903 2 $ 000	903 4 $ 000
B. Are less than the value carried on the books of the U.S. affiliate?	903 3 $ 000	903 5 $ 000

4.2 Use similar answer spaces when requesting the same type of information.

Within the questionnaire, it is also important to use similar types of answer spaces when respondents are being asked for the same type of information. Research has shown that respondents use all the available information to help them formulate an answer. That is, in addition to the questions themselves, respondents use information provided by the response categories and answer spaces (Sudman *et al.*, 1996). Labeling response categories with clarifying information about what is being requested, using appropriate symbols, and providing answer spaces sized appropriately for the information being requested improves the likelihood that respondents will provide the

type of information desired by the survey sponsor (Couper *et al.,* 2001; Christian *et al.,* 2007).

For economic surveys at the U.S. Census Bureau, where detailed numeric information is often requested, some paper questionnaires provide delineated answer spaces while others use a single open answer space. For example, the Annual Retail Trade Survey uses open text boxes for dollar amounts (Figure 6). In contrast, the Annual Wholesale Trade Survey uses a delineated box where dashed lines separate spaces for billions, millions, and thousands of dollars (Figure 7).

Figure 6. An open box for respondents to report dollar amounts

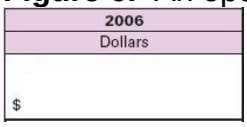
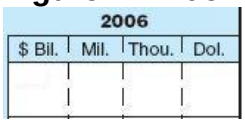


Figure 7. A delineated box for respondents to report dollar amounts



Cognitive testing of these instruments has revealed that respondents do not have a strong preference for open answer spaces or delineated answer spaces, as long as the answer spaces are sized appropriately for the information being requested (Morrison and O'Neill, 2007). Some survey sponsors have suggested that they prefer delineated answer spaces because delineated spaces either decrease the cost of keying forms or increase accuracy when questionnaires are optically scanned and verified. These survey sponsors believe that delineated answer spaces often require less interpretation on the part of the keyer or the verifier; however, there is no experimental evidence that this is the case. In deciding for or against delineated answer spaces, forms designers should rely on testing with respondents, as well as keyers and verifiers.

A related issue arises in how to indicate to respondents that they are to report dollars. Some surveys print "000" in the dollars column of the answer space to indicate that respondents should report in thousands of dollars, while others print "000.00." Still other surveys provide ".00" to indicate that responses are to be rounded to the nearest dollar. We have not seen any empirical evidence or other indication that respondents have a preference for one style or another, or that one style performs better from a processing standpoint. Therefore, we have chosen not to recommend one particular style over another. Our main point is that the answer space should be consistent within a questionnaire.

Overall, it is desirable to use the same type and physical dimensions of answer spaces when requesting similar information. For example, if percentages or dollar amounts are asked for in different parts of the questionnaire, it will help respondents if the same types of answer spaces are used (*e.g.*, delineated or not) and if the dimensions and labels (*e.g.*, $ or %) are also similar across answer spaces.

In addition, on electronic questionnaires, it is helpful to use radio buttons (also known as option buttons) when asking respondents to select only one response and HTML boxes when respondents may select more than one response. These visual cues should also be reinforced with written instructions because some respondents may not readily know the difference between radio buttons and HTML boxes. In the Surveyor system, HTML boxes are used instead of radio buttons, because radio buttons cannot be unselected once a selection is made.

4.3 Clearly indicate the unit of measurement for each data item.

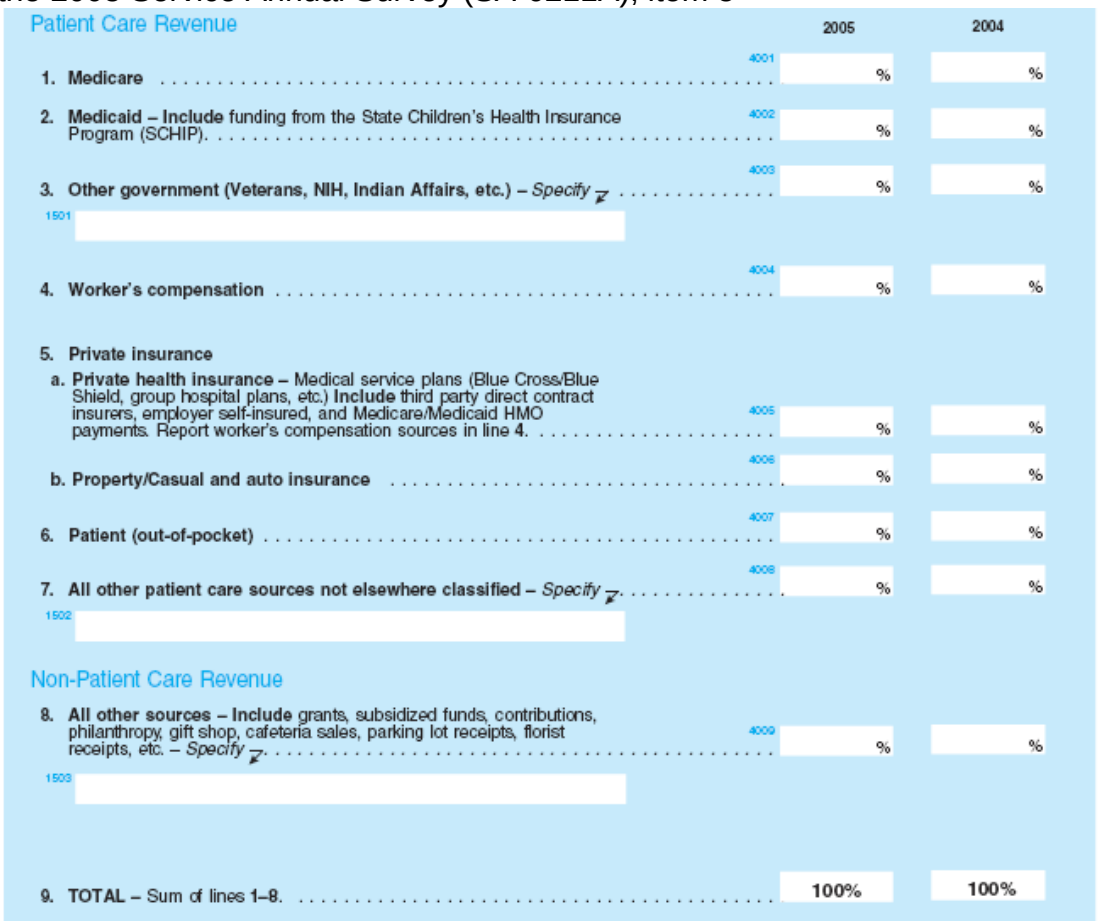
Respondents use the answer space as additional information in discerning the type of response that is expected (Couper *et al*., 2001; Christian *et al*., 2007). Questionnaires can help respondents report in the appropriate unit of measurement by adding symbols and words near or in answer spaces. For example, the Annual Capital Expenditures Survey asks respondents to report in thousands of dollars. To communicate this expectation to respondents, they use words ("Report in thousands of dollars") and add zeroes in the ones, tens, and hundreds positions. (See Figure 8.)

Figure 8. An indication of the unit of measurement (thousands of dollars) from the Annual Capital Expenditures Survey, Census Taker, version 3

		Report in thousands of dollars (do not include commas)
1.	Acquisition cost of depreciable assets (structures and equipment) at beginning of year	$,000.00
2.	Total capital expenditures (If 'None', enter '0')	$,000.00
3.	Other additions and acquisitions (Please specify in the 'Remarks' section at the end of this survey.)	$,000.00

Another example comes from the paper version of the 2005 Service Annual Survey (SA-6211A), item 5, where respondents are to record the percentage of patient care revenue by source (Figure 9). Each answer space contains a percent sign to reinforce the concept of reporting in percentages. In addition, to emphasize that the percentages need to add to 100, the questionnaire prints "100%" in the answer space at the bottom of each column.

Figure 9. An indication of the unit of measurement (percentages that add to 100) from the 2005 Service Annual Survey (SA-6211A), item 5



Patient Care Revenue

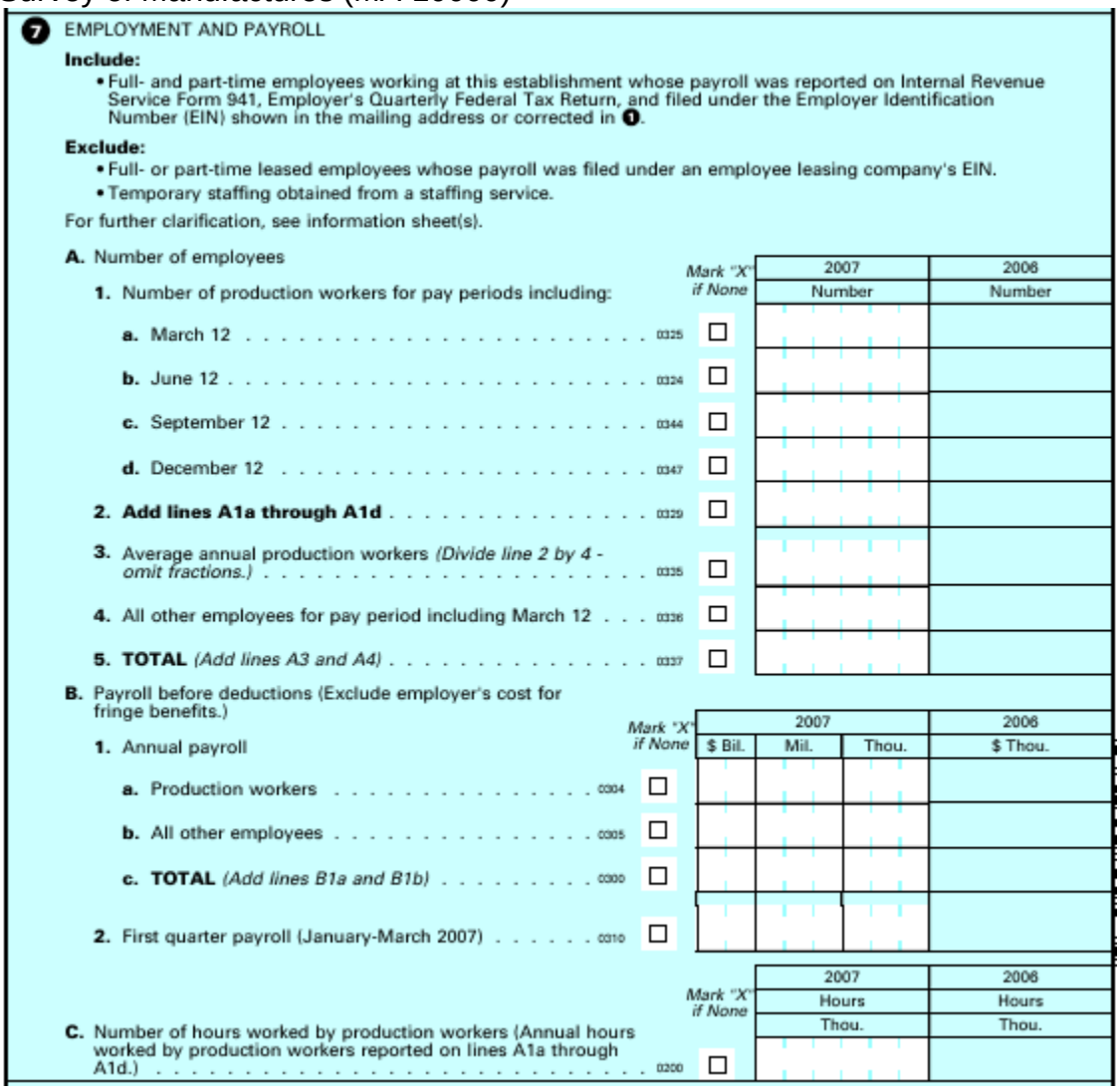
		2005	2004
1. Medicare	4001	%	%
2. Medicaid – Include funding from the State Children's Health Insurance Program (SCHIP).	4002	%	%
3. Other government (Veterans, NIH, Indian Affairs, etc.) – Specify	4003	%	%
1501			
4. Worker's compensation	4004	%	%
5. Private insurance			
a. Private health insurance – Medical service plans (Blue Cross/Blue Shield, group hospital plans, etc.) Include third party direct contract insurers, employer self-insured, and Medicare/Medicaid HMO payments. Report worker's compensation sources in line 4.	4005	%	%
b. Property/Casual and auto insurance	4006	%	%
6. Patient (out-of-pocket)	4007	%	%
7. All other patient care sources not elsewhere classified – Specify	4008	%	%
1502			

Non-Patient Care Revenue

8. All other sources – Include grants, subsidized funds, contributions, philanthropy, gift shop, cafeteria sales, parking lot receipts, florist receipts, etc. – Specify	4009	%	%
1503			
9. TOTAL – Sum of lines 1–8.		100%	100%

Questionnaires often collect information in a variety of units of measurement. It is easiest on respondents if the questionnaire does not switch from one unit to another, especially within the same question, as shown in Figure 10. If possible, try to group data elements together by unit of measurement. Alternatively, start items with new units of measurement on a new page or screen, or create a new question with a new question number.

Figure 10. Different units of measurement within one question, from the 2007 Annual Survey of Manufactures (MA-10000)



7 EMPLOYMENT AND PAYROLL

Include:

- Full- and part-time employees working at this establishment whose payroll was reported on Internal Revenue Service Form 941, Employer's Quarterly Federal Tax Return, and filed under the Employer Identification Number (EIN) shown in the mailing address or corrected in 1.

Exclude:

- Full- or part-time leased employees whose payroll was filed under an employee leasing company's EIN.
- Temporary staffing obtained from a staffing service.

For further clarification, see information sheet(s).

A. Number of employees

		Mark "X" if None	2007 Number	2006 Number
1. Number of production workers for pay periods including:				
a. March 12	0325	☐		
b. June 12	0324	☐		
c. September 12	0344	☐		
d. December 12	0347	☐		
2. Add lines A1a through A1d	0329	☐		
3. Average annual production workers *(Divide line 2 by 4 - omit fractions.)*	0335	☐		
4. All other employees for pay period including March 12	0336	☐		
5. TOTAL *(Add lines A3 and A4)*	0337	☐		

B. Payroll before deductions (Exclude employer's cost for fringe benefits.)

		Mark "X" if None	2007 $ Bil.	2007 Mil.	2007 Thou.	2006 $ Thou.
1. Annual payroll						
a. Production workers	0304	☐				
b. All other employees	0305	☐				
c. TOTAL *(Add lines B1a and B1b)*	0300	☐				
2. First quarter payroll (January-March 2007)	0310	☐				

		Mark "X" if None	2007 Hours Thou.	2006 Hours Thou.
C. Number of hours worked by production workers (Annual hours worked by production workers reported on lines A1a through A1d.)	0200	☐		

4.4 Decide whether or not to provide previously reported data to respondents after weighing the potential data quality benefits and risks and the potential disclosure and security risks.

The experimental evidence on the usefulness and effectiveness of providing previously reported data is mixed. On one hand, pre-printed data can increase data quality and reduce cognitive burden (Holmberg, 2002; Hoogendoorn, 2004; Pafford, 1986). On the other hand, providing previously reported data to respondents might cause respondents to employ a strategy in which they do as little work as possible to derive an acceptable but not optimal answer (Phillips *et al*., 1994; Stanley and Safer, 1997; Pafford, 1988), perpetuate data errors from one reference period to the next (Stanley and Safer, 1997; Pafford, 1988), or miss data errors unless they are very large (Phillips *et al*., 1994).

There are legitimate concerns about providing previously reported data to respondents. Response bias may occur, partly due to respondents using historical data to anchor and adjust for the current reference period without consulting records. Another risk of response bias could occur if respondents do not consult records and fail to realize that there has been a change in organizational structure, such as through a merger and/or acquisition. Finally, there is a risk for unintentional disclosure, possibly through misdelivered mail or a new company/establishment at the address on record.

When deciding whether or not to provide previously reported data, survey programs can analyze reported data to find out about the variability among responses from one reporting period to the next. If response variability is high, it may be useful for respondents to have the previously reported data available to them (Holmberg, 2002). If it appears that previously reported data would be beneficial for respondents, we recommend consulting the Disclosure Review Board for their feedback on disclosure concerns and conducting studies to determine whether significant bias or measurement error would be introduced into the data as a result.

There is variation across the Economic Directorate in terms of whether survey programs choose to provide respondents with data that they reported on a previous survey.

- Manufacturing and Construction Division (MCD): Some of the manufacturing survey programs – including the Manufacturers' Shipments, Inventories, and Orders (M3), Annual Survey of Manufactures, Current Industrial Reports, and the Value of New Construction Put in Place – print previously reported data on paper questionnaires. The M3 survey provides 2 months of prior data, while the Value of New Construction Put in Place provides up to 12 months of data. Both programs have provided prior data at least since the mid- to late-1990s. Both programs cite an ease on respondent burden by providing previously reported data: rather than pulling up the prior month's records to find out what was already reported, respondents need only pull the current months' records. This allows respondents to avoid double-reporting of figures. Another reason the M3 provides prior period data is that new respondents at companies find it useful to know what has already been reported.

- Service Sector Statistics Division (SSSD): The Quarterly Services Survey (QSS) does not provide previously reported data on paper or electronic questionnaires, citing concerns about disclosure and security. However, previously reported data is provided at respondents' request; respondents must send a letter on company letterhead in order to receive it. Many years ago, SSSD provided previously reported data to respondents on their current surveys. The practice was stopped because studies indicated the presence of response bias. Unfortunately, the documentation for these studies no longer exists.

- Economic Planning and Coordination Division: The Medical Expenditures Panel Survey, which is mailed to about 40,000 establishments annually, does

not provide previously reported data. A new sample is drawn each year, and there are only about 600 cases in the sample from one year to the next. Since so few cases carry over from one year to the next, it is cost-prohibitive to create a second set of questionnaires to send to those few cases, or to add it to the existing forms when it would not be applicable for the vast majority of the cases in the sample.

- Company Statistics Division: The Survey of Business Owners does not include previously reported data on their questionnaires, either. Since the survey is done every five years, with a new sample each time, there is no prior information available for most of the records.

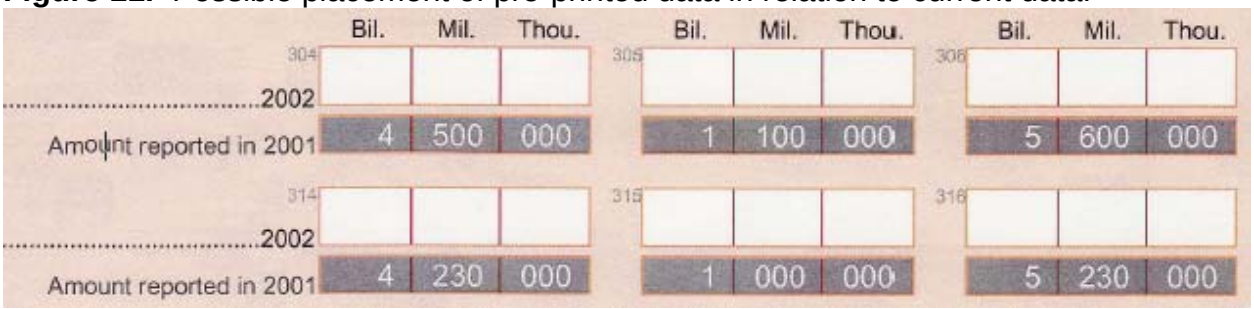
If a survey program decides to provide previously reported data to their respondents, we have a few recommendations.

1. Provide only reported data, not imputed or edited data. Providing imputed or edited data will likely cause confusion for respondents, especially if they are comparing their file copy of the previous period's report to the current period. If a respondent provided data in the incorrect format (*e.g.*, reporting dollars when they are asked to round to thousands), it is acceptable to provide reported data back to the respondent in the appropriate format. Doing so may encourage respondents to report properly on subsequent questionnaires.

2. Providing previously reported information that was reported in the distant past is not beneficial to respondents. If the prior period was one year ago or less (*e.g.*, 2008 is the current period and 2007 is the prior period), providing previously reported data may be worth considering. If the prior period was more than a year ago (*e.g.*, from one economic census to the next), providing previously reported data is not likely to be useful.

3. Place the previously reported data in close proximity to data currently being requested. One option would be to place previously reported data below the answer space for currently requested data, and in a smaller font size. See Figure 11 for an example of this placement.

Figure 11. Possible placement of pre-printed data in relation to current data.



4.5 Provide "Mark 'X' if None" checkboxes if it is necessary to differentiate between item non-response and reported values of zero.

A "Mark 'X' if None" checkbox is an area where a respondent can indicate that their reported value for a given data element is zero, rather than writing "0" in the answer space. Of course, some respondents will choose to write zero, rather than check a box. However, providing a box may encourage respondents to report a zero, rather than leave an item blank. An example from the 2007 Economic Census paper instrument is shown in Figure 12; an example from the 2007 Business Expenses Supplement electronic instrument is shown in Figure 13.

Figure 12. Example of a checkbox, from 2007 Economic Census, paper version

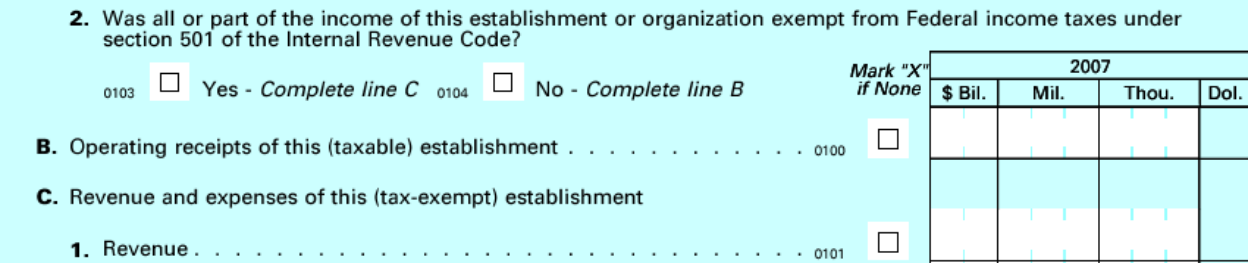
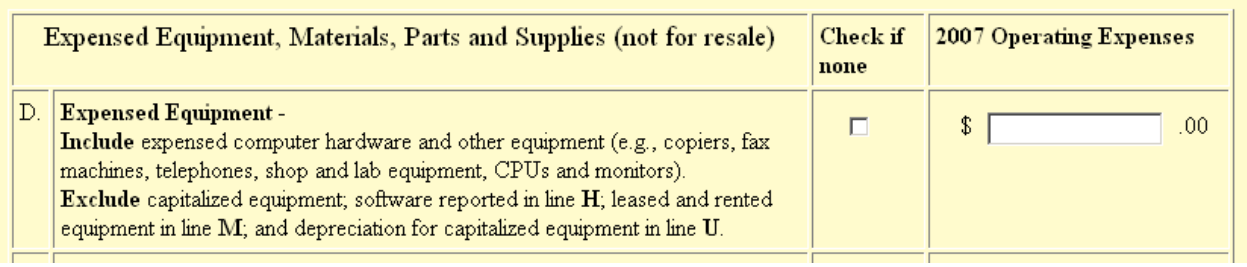


Figure 13. Example of checkbox, from 2007 Business Expenses Supplement, Census Taker version



Surveys may use different wording such as "Mark X if Zero" or "Check if None." Any of these phrases are appropriate, as long as the same phrase is used throughout the questionnaire.

We have no knowledge of any studies that examined the effectiveness or respondents' usage of such checkboxes. However, providing respondents with a checkbox may encourage them to provide a substantive response and makes it clear in the processing systems that respondents reported a zero, rather than assuming an item is missing (and ready for imputation).

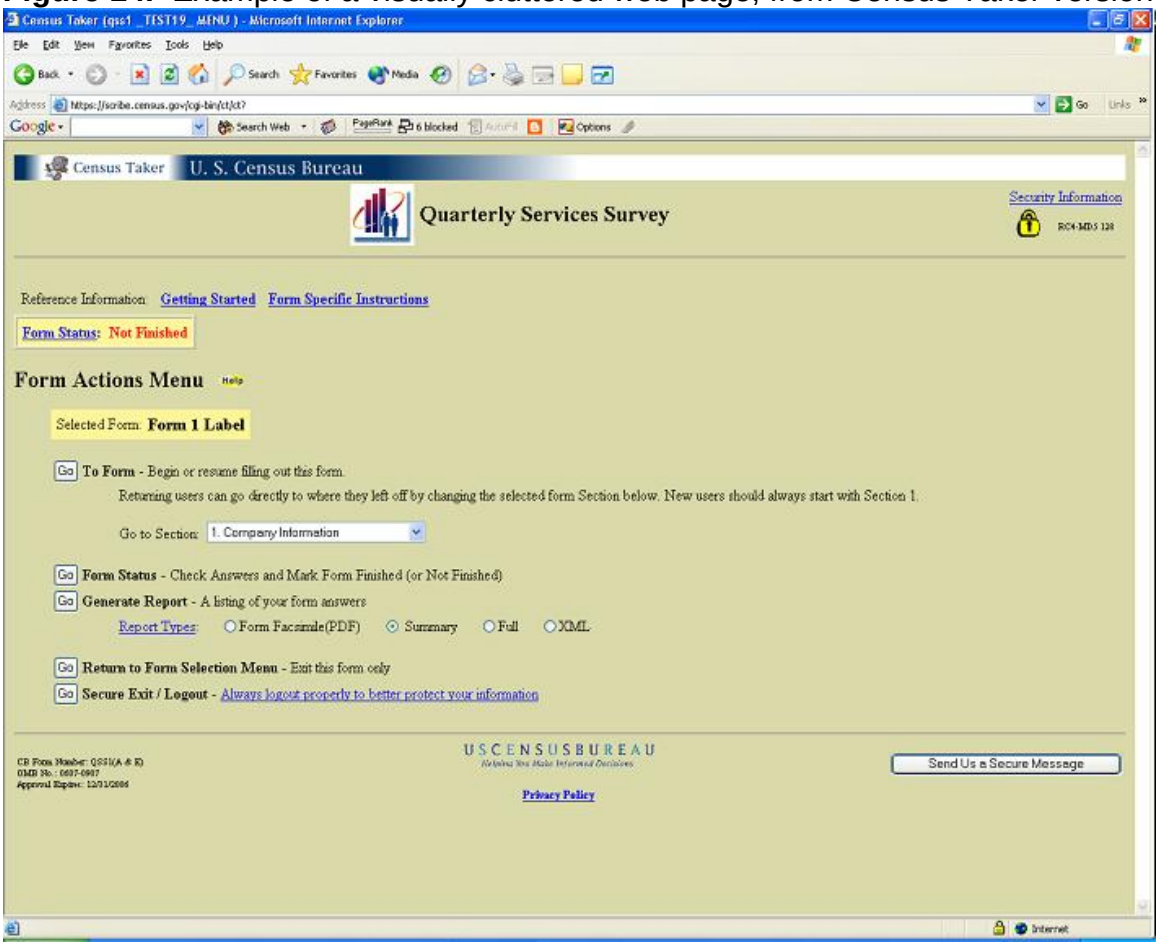
5. Guidelines on Eliminating Visual Clutter

Visual clutter refers to the introduction of symbols and other graphical features on pages that compete for attention and draw the respondent's attention away from the desired

navigational path. In electronic surveys, clutter can result from placing information on web pages that is not relevant to the completion process, as seen from the respondent's perspective. Examples include placing numerous graphics in different colors such as sponsor organization logos or security information.

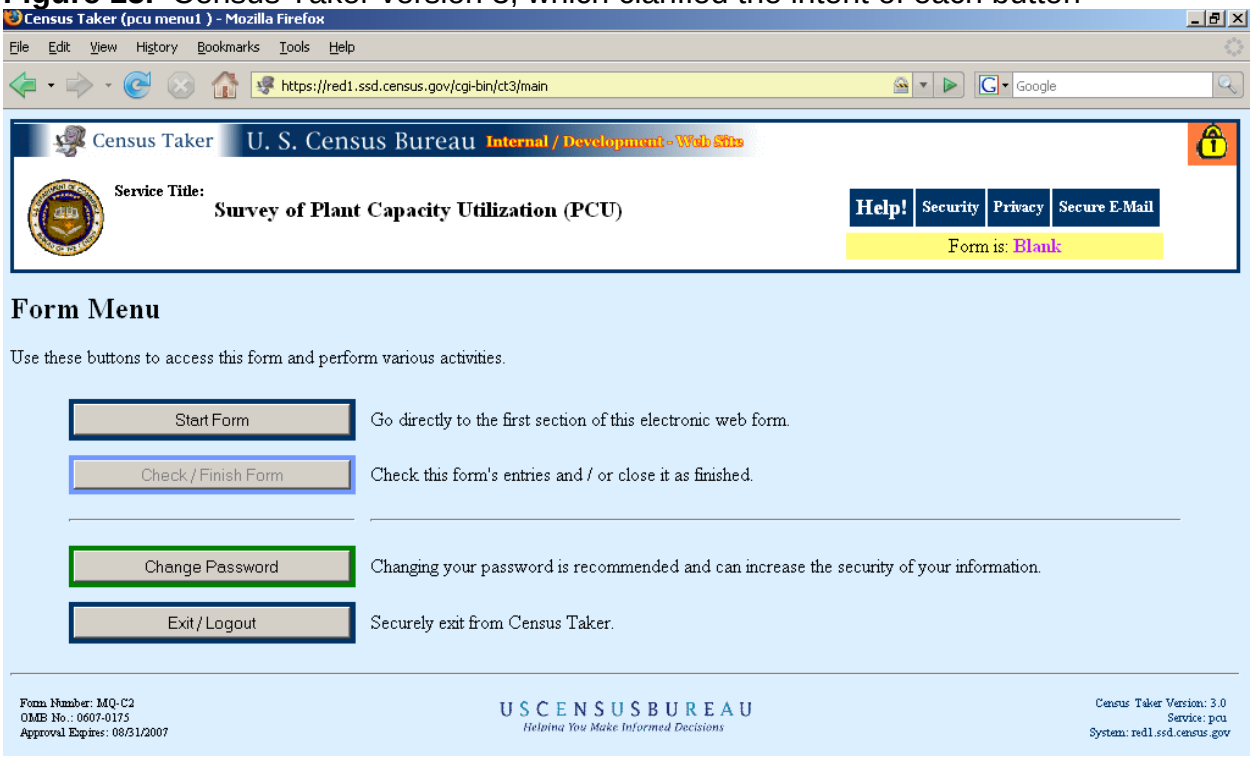
Figure 14 shows multiple examples of visual clutter on a page from an older version of Census Taker. At the top of the page, the words "Census Taker" appears in blue text on a white background, while "U.S. Census Bureau" appears in white text on a blue background. In addition, there are images associated with "Census Taker," "Quarterly Services Survey," and "Security Information." Below the headings, text is printed in black, red, and blue. Finally, the buttons labeled "Go" are not descriptive; rather, the text next to them is needed in order to understand which button to select.

Figure 14. Example of a visually cluttered web page, from Census Taker version 1.



Later versions of the Census Taker system have resolved some of these issues, such as the intention of each button. However, visual clutter remains. For example, Census Taker version 3 continues to use multiple colors for the fonts, multiple colors around each of the buttons has been added, and the multiple background and text colors in the heading for "Census Taker U.S. Census Bureau" are still present (see Figure 15).

Figure 15. Census Taker version 3, which clarified the intent of each button



Clutter can also result from what seems to be a lack of information organization. Examples include successive questions that are not aligned with each other (see section 6.5 for more information), answer categories that are displayed inconsistently, and the use of multiple different fonts (*e.g.*, see Dillman, 2000, pp. 110-11, Figures 3.13 and 3.14). Differences in size, shape, brightness, color, and contrast often contribute to the cluttered appearance of pages. In essence, competing graphical features draw the respondent's attention away from the critical pieces of information that are needed for comprehending the questionnaire and completing it properly. This section of the guidelines discusses three ways to eliminate visual clutter.

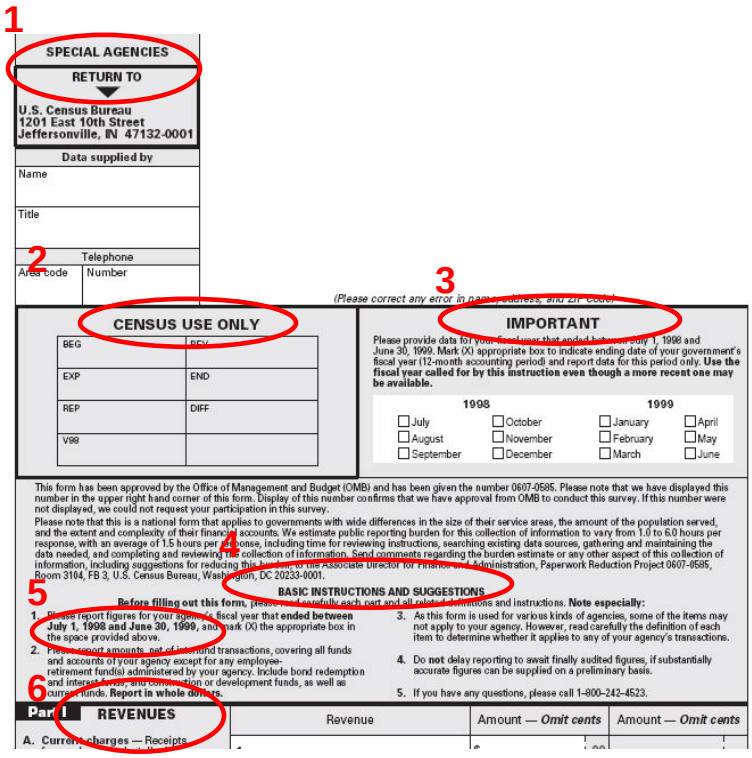
5.1 Use font variations consistently and for a single purpose within a questionnaire.

Survey designers can vary the fonts used in a questionnaire by changing the size, contrast (bolding and color), and style (italics, capitalization, serif vs. sans serif fonts, etc.). Using the same font or text style for different purposes in one questionnaire can confuse respondents. For example, bolding can be used to draw attention to a particular word or phrase so that people quickly and easily process that information. However, when many items are bolded in the questionnaire it reduces the effect of highlighting any one item (Ware, 2004). The 2004 Annual Survey of Local Government Finances used bold text for several purposes on the first page of the questionnaire (see Figure 16). Bolding was used to denote:

1. The "Return To" information

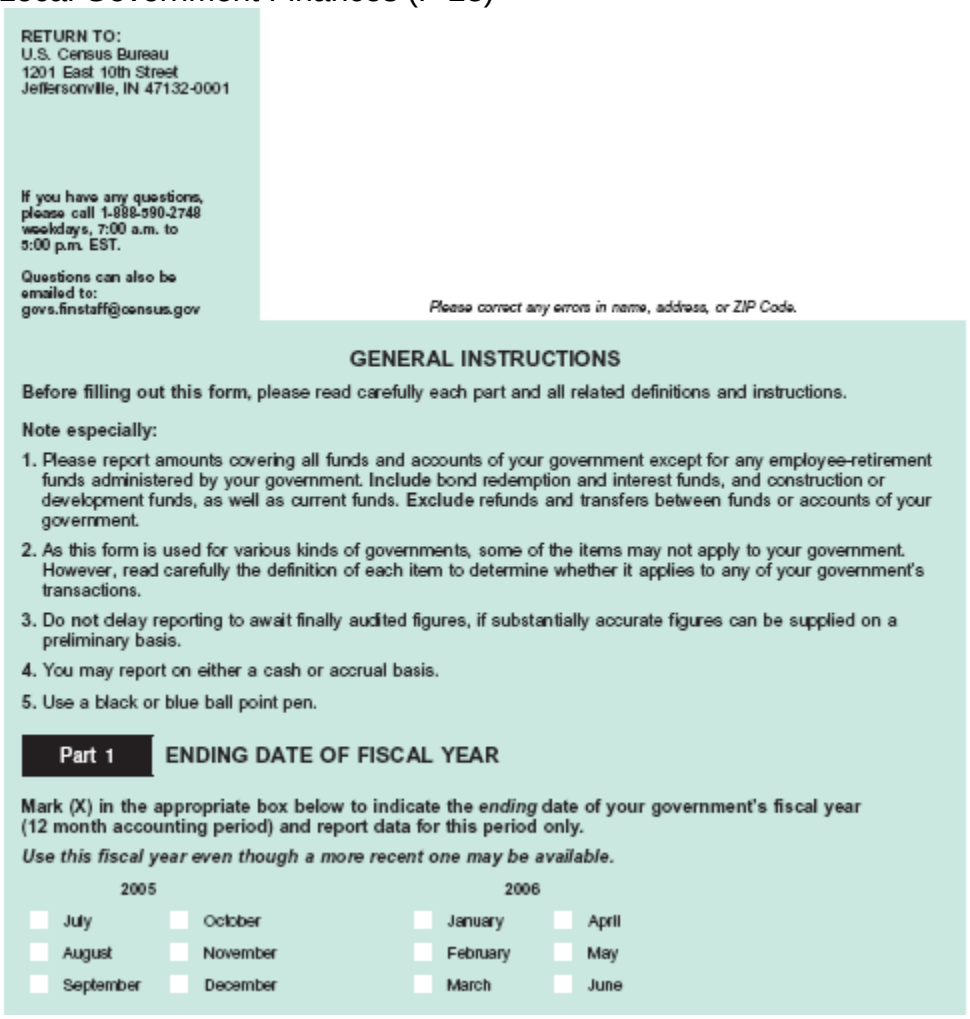
2. "Census Use Only" information
3. The header for "Important"
4. The header for "Basic Instructions and Suggestions"
5. Emphasis within instructions (*e.g.*, "ended between July 1, 1998 and June 30, 1999), and
6. The Part 1 Section Header "Revenues"

Figure 16. Bold text used for multiple purposes on the front page of the 2004 Annual Survey of Local Government Finances (F-28)



Cognitive interviews with 28 respondents to the survey indicated that they did not understand why bold text was being used and were confused because bolding was used for different purposes. The Annual Survey of Local Government Finances later underwent a significant redesign. As part of that redesign, bold print was reserved for headings and questions only, as shown in Figure 17. In addition to being bold, headings were printed in upper case letters with a larger font. This made the bolded headings stand out from the bolded questions, which is another good example of applying multiple font variations in a consistent manner.

Figure 17. Bold text used for headings and questions, from the 2006 Annual Survey of Local Government Finances (F-28)



RETURN TO:
U.S. Census Bureau
1201 East 10th Street
Jeffersonville, IN 47132-0001

If you have any questions, please call 1-888-590-2748 weekdays, 7:00 a.m. to 5:00 p.m. EST.

Questions can also be emailed to: govs.finstaff@census.gov

Please correct any errors in name, address, or ZIP Code.

GENERAL INSTRUCTIONS

Before filling out this form, please read carefully each part and all related definitions and instructions.

Note especially:

1. Please report amounts covering all funds and accounts of your government except for any employee-retirement funds administered by your government. Include bond redemption and interest funds, and construction or development funds, as well as current funds. Exclude refunds and transfers between funds or accounts of your government.
2. As this form is used for various kinds of governments, some of the items may not apply to your government. However, read carefully the definition of each item to determine whether it applies to any of your government's transactions.
3. Do not delay reporting to await finally audited figures, if substantially accurate figures can be supplied on a preliminary basis.
4. You may report on either a cash or accrual basis.
5. Use a black or blue ball point pen.

Part 1 **ENDING DATE OF FISCAL YEAR**

Mark (X) in the appropriate box below to indicate the *ending* date of your government's fiscal year (12 month accounting period) and report data for this period only.

Use this fiscal year even though a more recent one may be available.

2005		2006	
July	October	January	April
August	November	February	May
September	December	March	June

Applying font variations consistently – for example, where bold text is used for one purpose and reverse-print for another – can clarify the questionnaire and help respondents see how information is related. The Gestalt principle of similarity states that people are more likely to see information as related when similar in color, size, style, and shape (Lidwell *et al*., 2003; Ware, 2004). By expressing the same type of information using similar font variations, respondents can more easily distinguish between different types of survey information in the questionnaire (Dillman *et al*., 2005). Consistency in how textual information is displayed is important in improving usability, helping people learn new things quickly, and focusing people's attention on relevant information (Lidwell *et al*., 2003).

Overall, it can be helpful to establish rules for how font variations such as color, size, bolding, italics, capitalization, reverse print, etc. should be used so that only one meaning is assigned to each variation within a questionnaire. Then, apply font variations consistently throughout the questionnaire. Different rules may be developed for specific questionnaires based on whether paper and/or web is used, the complexity

and type of information being requested, and the respondents who will be answering the survey. However, almost all respondents will be confused if one font variation, such as bolding, is used for multiple purposes within the questionnaire.

5.1a Recommended font variations for paper surveys

- Print data item numbers in reverse-print bubbles (*e.g.*, ❶, ❷, ❸). Doing so helps respondents complete the questions in the intended order and helps respondents distinguish questions from other information.
- Use sans serif fonts for all text.
- Print questions in bold, with a minimum of 8-point font. If possible, print questions in a larger point size than instructions and response options.
- Print instructions in italics, with a minimum of 8-point font.
- Print response options in plain text, with a minimum of 8-point font.
- De-emphasize keycodes for respondents:
    - Place keycodes outside the answer spaces so that respondents are not distracted by them when writing their answers.
    - Print in a smaller font size (*e.g.*, the economic census paper forms use 6-point font)
    - Use a darker shade of the questionnaire's background color (*e.g.*, dark blue if the questionnaire is light blue). Be considerate of keyers' abilities to read keycodes that are printed in this fashion.
    - If there is no background color on the questionnaire, use gray for keycodes.
    - See Figure 18 for a recommended display of keycodes.
- "Census Use Only" spaces:
    - Place them below all questions and answer spaces on the page.
    - Consider the following alternatives for shading of text, borders, and spaces, presented in order of preference starting with the most preferred.
        i. Shade the spaces, so that they are the same as the background color of the questionnaire, not white. Print text and borders in a darker shade of the background color (like the keycodes). See Figure 19 for an example of displaying "Census Use Only" spaces in the same color as the background color.
        ii. Use gray for text and borders, and white for the spaces (see Figure 20 for an example).
- Refer to the Style Guide for the 2007 Economic Census Paper Forms (Upchurch, 2006), which provides additional guidance for the styles and font variations.

Figure 18. Keycodes in a darker shade of the background color, located outside the answer space

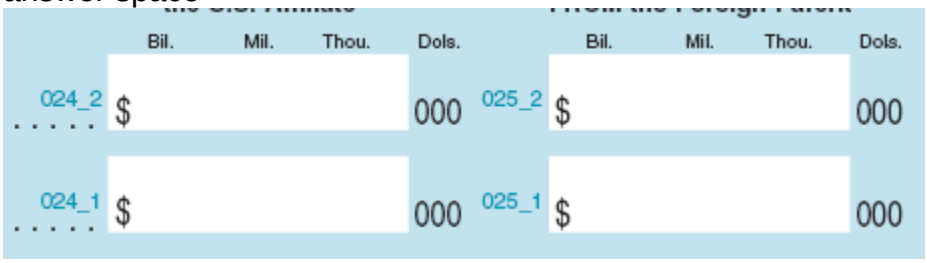


Figure 19. One way to display "Census Use Only" spaces, using non-white areas, from the 2007 Census of Governments Survey of Locally-Administered Public-Employee Retirement Systems (F-11)

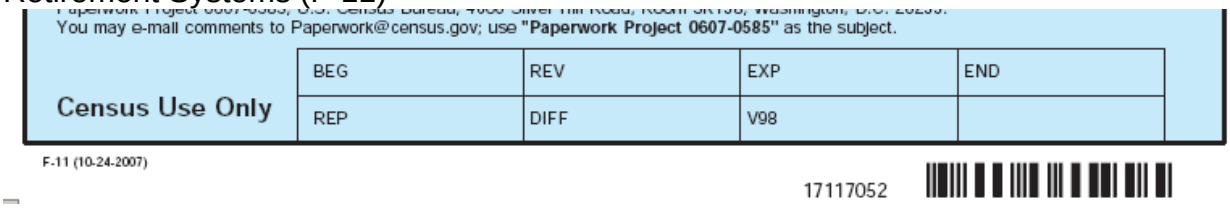


Figure 20. "Office Use Only" areas from the Agricultural Resource Management Survey, conducted by the National Agricultural Statistical Service (NASS)

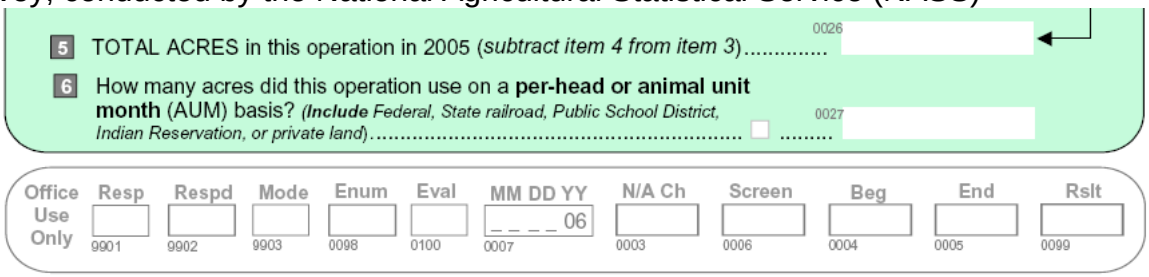
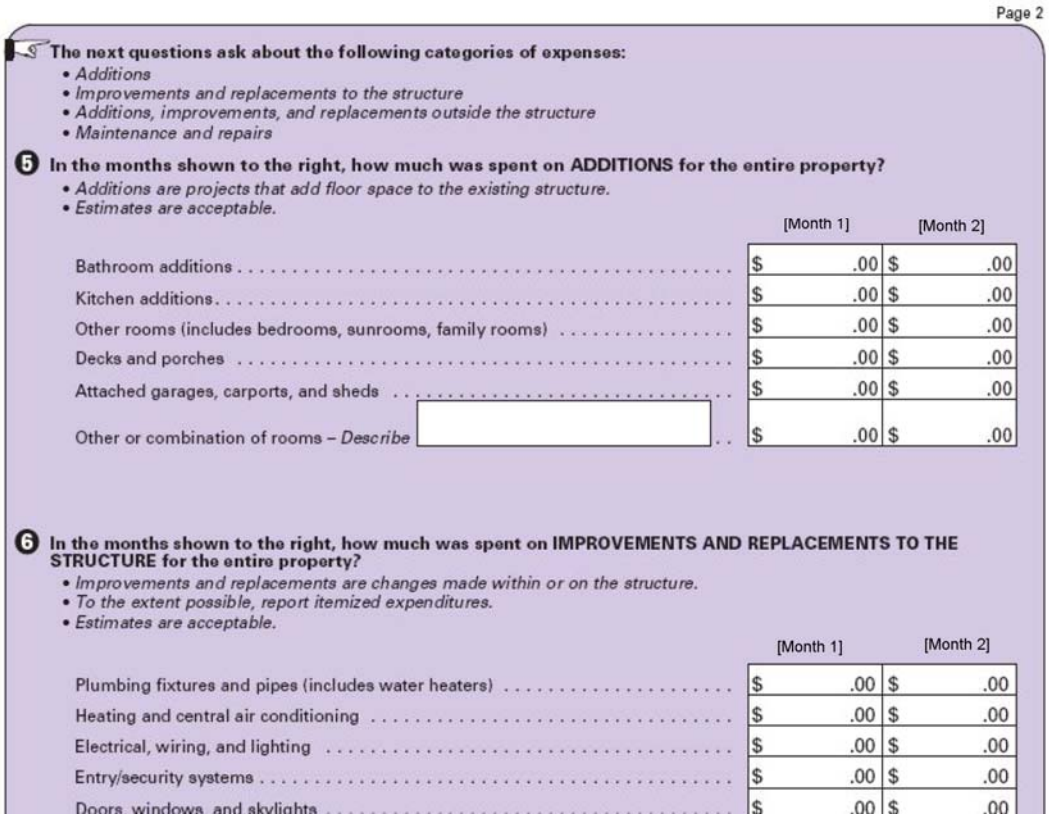


Figure 21 shows a consistent use of font variations in the Survey of Residential Alterations and Repairs. For that survey, questions were printed in bold text, while instructions were in italics. Response options were in plain text.

Figure 21. Consistent usage of font variations, from the Survey of Residential Alterations and Repairs (SORAR-705)



Page 2

The next questions ask about the following categories of expenses:

- *Additions*
- *Improvements and replacements to the structure*
- *Additions, improvements, and replacements outside the structure*
- *Maintenance and repairs*

❺ In the months shown to the right, how much was spent on ADDITIONS for the entire property?

- *Additions are projects that add floor space to the existing structure.*
- *Estimates are acceptable.*

	[Month 1]	[Month 2]
Bathroom additions	$ .00	$ .00
Kitchen additions	$ .00	$ .00
Other rooms (includes bedrooms, sunrooms, family rooms)	$ .00	$ .00
Decks and porches	$ .00	$ .00
Attached garages, carports, and sheds	$ .00	$ .00
Other or combination of rooms – *Describe*	$ .00	$ .00

❻ In the months shown to the right, how much was spent on IMPROVEMENTS AND REPLACEMENTS TO THE STRUCTURE for the entire property?

- *Improvements and replacements are changes made within or on the structure.*
- *To the extent possible, report itemized expenditures.*
- *Estimates are acceptable.*

	[Month 1]	[Month 2]
Plumbing fixtures and pipes (includes water heaters)	$ .00	$ .00
Heating and central air conditioning	$ .00	$ .00
Electrical, wiring, and lighting	$ .00	$ .00
Entry/security systems	$ .00	$ .00
Doors, windows, and skylights	$ .00	$ .00

5.1b Recommended font variations for electronic surveys

- Print data item numbers in reverse-print bubbles (*e.g.*, ❶, ❷, ❸). Doing so helps respondents complete the questions in the intended order. If the electronic display cannot clearly present data items in this format, i.e., the reverse-print bubbles appear fuzzy, do not use this font variation but be sure to clearly indicate the order in which questions should be completed.
- Use sans-serif fonts for all text.
- When possible, put questions in bold and have the font size for the questions be larger than the font size for the instructions and response options.
- Put instructions and response options in plain text.
- Avoid the use of italics.
- Refer to the Census Taker Style Guide (Anderson *et al.*, 2007) and the Surveyor Style Guide (Gray and Balogh, 2007) for additional discussions on the capabilities, design conventions, and limitations of those instruments.

5.2 Group data items and their answer spaces / response options.

In some questionnaires, using the full width of a page causes answer spaces to become

widely separated from the query they correspond to, as shown in Figure 21, where the queries are on the left side of the page and the answer spaces are on the right side. The principle of proximity, recognized by the heuristic of "near means related," suggests that wide separation makes it difficult for respondents to see these components of a single question as belonging together. One solution for paper questionnaires is to use dot leaders to connect the question to its answer space, also shown in Figure 21. In addition to showing the respondent that these elements belong together, it helps respondents be sure they are on the right line when providing each response.

In electronic questionnaires, it is sometimes not possible to effectively use dot leaders because of browser or screen configurations and other differences. Instead, it is recommended that the same effect be created by shading lines in alternate colors across the page, as shown in Figure 22. As long as there is sufficient contrast between the text and background color, as in Figure 22, this method meets Section 508 accessibility compliance regulations and the Census Taker Style Guide. We recommend that survey programs consider using the Census Take Style Guide and/or Surveyor Style Guide as resources prior to making a decision whether or not to pursue this design option.

Figure 22. An example of the use of shading in a web survey, from a customer satisfaction survey

Please indicate your level of agreement or disagreement with each of these statements regarding the store you visited.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Stores are conveniently located.	○	○	○	○	○
Store hours are convenient for my shopping needs.	○	○	○	○	○
Store atmosphere and decor are appealing.	○	○	○	○	○
A good selection of products was present.	○	○	○	○	○
Store has the lowest prices in the area.	○	○	○	○	○
Merchandise sold is of the highest quality.	○	○	○	○	○
The merchandise sold is a good value for the money.	○	○	○	○	○

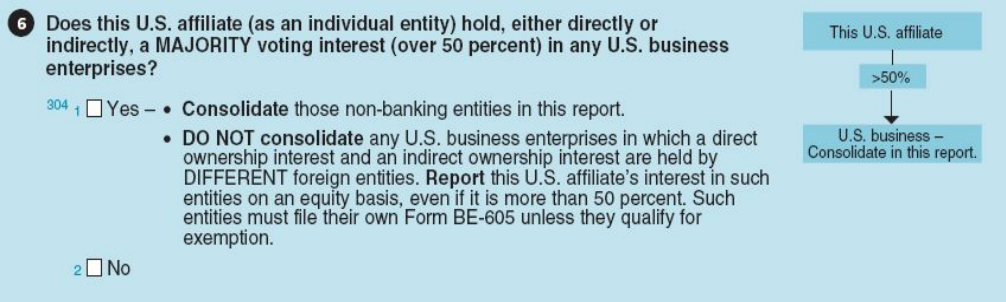
5.3 Evaluate the necessity of any graphics, images, and diagrams to ensure that they are useful for respondents.

Respondents pay attention not only to the verbal language on the page, but also the symbolic, numeric, and graphical languages, which have the potential to affect the answers to questions (Redline and Dillman, 2002). Photographic images or other graphics shown on the screen during a web survey can affect responses, though it is unclear how the addition of images affects the accuracy of reporting (Couper *et al*., 2004).

In some cases, the symbols used on a questionnaire can be beneficial. For instance, in Figure 21 on page 32, a pointed finger at the top of the page was used to call attention to an introductory statement about what the upcoming questions would ask about. Cognitive testing with approximately 35 respondents indicated its necessity and usefulness. Respondents paid attention to the symbol and the associated text.

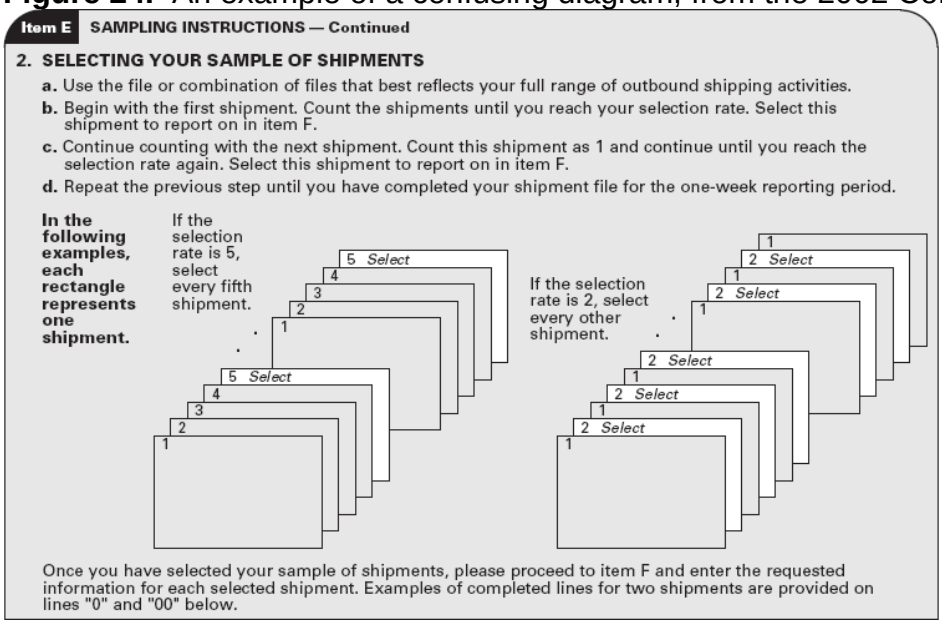
Another example of a useful symbol comes from the Bureau of Economic Analysis' quarterly foreign direct investment questionnaire. Identifying the correct reporting unit is a critical component of the questionnaire. During respondent debriefings, researchers found that respondents often used corporate organizational charts to figure out which entities should be included and excluded. Simplified versions of organizational charts were therefore developed and displayed with questions concerning the reporting unit (see Figure 23 for an example). The charts did not replace the question, but cognitive interviews with approximately 60 respondents showed that the visual representation of corporate entities, something respondents were already familiar with, assisted their comprehension of the question (Tuttle and Morrison, 2006).

Figure 23. A complex question with a useful diagram (simplified organizational chart), from the Bureau of Economic Analysis' quarterly foreign direct investment questionnaire



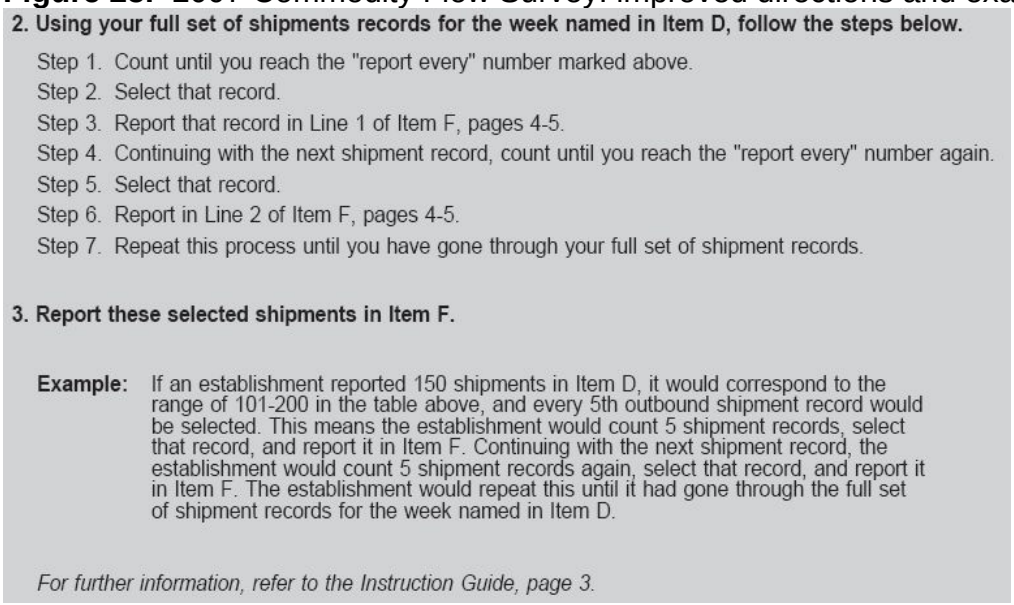
There are times, however, when diagrams can be confusing. In the Commodity Flow Survey (CFS), respondents must select a systematic sample of their shipping records in order to complete the survey correctly. The selection rate is based on the total number of outbound shipments made during a one-week reporting period. In the 2002 survey, respondents were provided with instructions and a diagram to assist in this effort (Figure 24). Each rectangle represented a single shipping record, and the white rectangles indicated the record that was to be selected. Cognitive testing revealed that most respondents did not understand what the rectangles represented. Of those that understood the concept of selecting every n^{th} record, they often neglected to read the accompanying text that indicated the diagrams were examples. Rather than using their own selection rate, they picked a selection rate of either 2 or 5 since those were the examples shown. The diagrams were confusing and were removed when the form was redesigned for the 2007 survey.

Figure 24. An example of a confusing diagram, from the 2002 Commodity Flow Survey



In the 2007 survey, respondents were guided through the process of selecting their systematic sample more explicitly by using improved step-by-step directions and a clearly marked example (see Figure 25).

Figure 25. 2007 Commodity Flow Survey: improved directions and example



It should be noted that while this guideline applies to both paper and electronic questionnaires, the graphics in electronic surveys might not be as crisp as they appear on paper. Therefore, survey programs should ensure that any diagrams, symbols, and images are clear when they are shown on a computer screen.

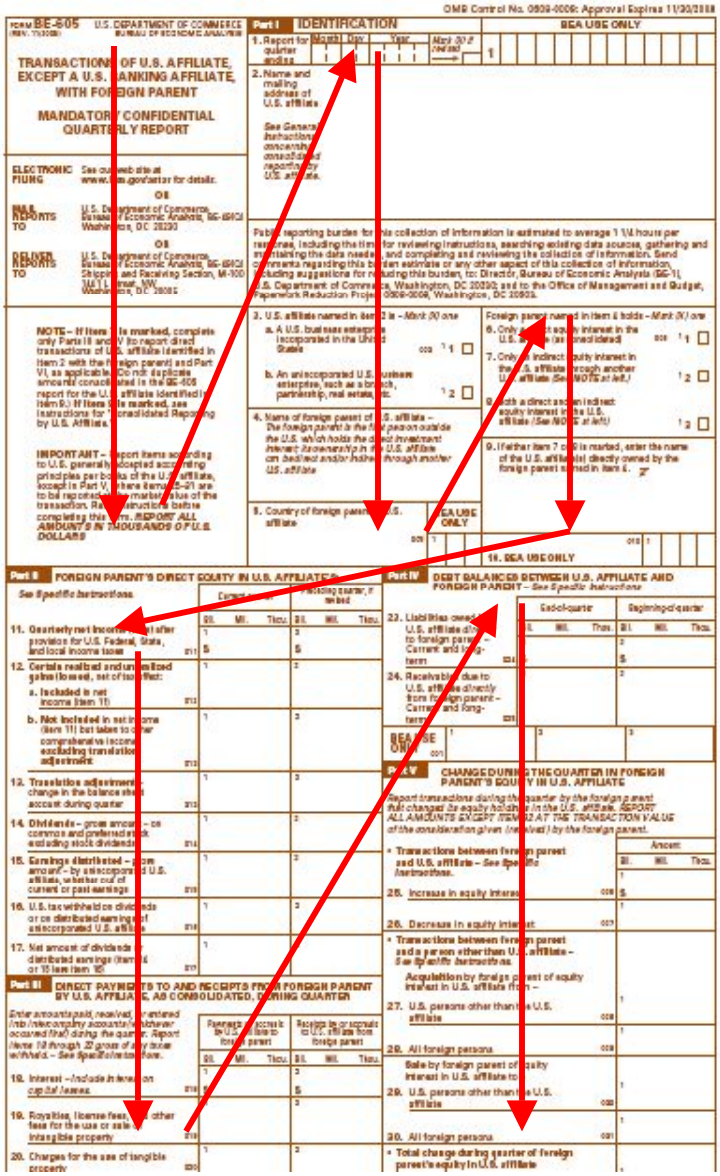
6. Guidelines on Establishing a Clear Navigational Path

Since there is no interviewer present to guide respondents as they complete self-administered questionnaires, establishing a clear navigational path helps to ensure that respondents complete the questions in the intended order and answer all the questions in the survey (or at least all that apply to them). Effectively applying visual design principles can help survey designers develop questionnaires with a clear navigational path that helps respondents move through questions in the desired sequence. Dillman (2000) describes a number of specific principles for establishing a navigational path and guiding respondents from one question to the next (pp. 105-129).

An example of a very complex navigational path can be seen in Figure 26 from the first page of the Bureau of Economic Analysis' (BEA) former quarterly foreign direct investment questionnaire, which was used before 2007. This form was on legal-sized paper where respondents had to process information horizontally and vertically. Since respondents had to read through multiple columns of information at the top and then the bottom of the page, it was as if two different newspapers had been placed on top of each other. In addition, respondents were supposed to begin answering in the middle of the top half of the page. Section numbers such as "Part 1" were in reverse print to help respondents identify that this was a new part of the survey; however, individual question numbers were often difficult to perceive. In addition, the extensive use of lines divided the page into many small units making it difficult to easily discern the desired navigational path. According to the Gestalt principle of simplicity, the use of inconsistent, irregular, and unfamiliar graphical features makes it hard to perceive and remember, thus making the response process more difficult.

This example illustrates the importance of several questionnaire design features in helping respondents navigate through the survey. For example, respondents need to be able to discern where to begin, clearly differentiate each question, distinguish where to provide their responses, and accurately move or navigate between questions. Together, effective use of visual design features can help guide respondents as they complete the survey.

Figure 26. A complex navigational path, from the Bureau of Economic Analysis' quarterly foreign direct investment questionnaire, pre-2007.



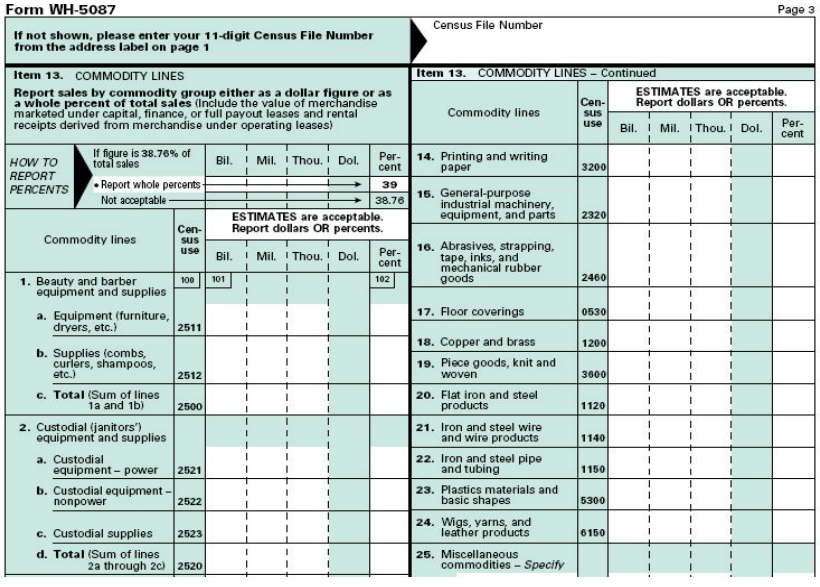
The BEA form was redesigned to help improve the navigational flow and other aspects of the design of the questionnaire. Several features of the general layout were modified to improve the usability and reduce respondent burden (see Figure 5 on page 19 for a sample page). First, the questionnaire was moved from legal to letter-sized paper because respondents prefer letter-sized paper, which is easier for business respondents to print, photocopy, fax, and file (Sudman *et al*., 1999). Second, a one-column vertical layout was adopted, rather than using multiple columns, so respondents did not have to process information horizontally across the page and vertically down the page.

6.1 Format the instrument consistently, taking advantage of familiar reading patterns.

To help respondents move between pages or screens in the questionnaire, it is important to use a consistent page layout so respondents do not have to reorient themselves to each new page or screen. For example, decide whether questions should be arranged in either one column or two columns, then use that layout for all pages or screens of a questionnaire. We recommend using a one-column format, as it is easier for respondents because they only have to process information in one direction. They are being assisted visually, so information is less likely to be missed. This is particularly important for economic surveys where questions often ask for detailed financial information and open-ended answer spaces are provided.

Two column formats can be confusing for respondents, especially when the columns are adjoined with a line, as in the 1997 Economic Census (see Figure 27). Though two columns can be read in a manner similar to a newspaper, a line is generally not a sufficient visual cue to convey that the columns are separate. Since the columns were adjoined with a vertical line, rather than separated with space, it was unclear whether respondents were supposed to work down columns or across rows, thus creating a problem with navigation. For instance, lines 2a through 2d line up with items 21 through 25. An extensive cognitive evaluation of 2000 Decennial Census Questionnaires revealed a tendency for respondents to jump from one column to the next when questions in the second column lined up perfectly with questions in the first column (Dillman *et al.,* 2004).

Figure 27. An example of a questionnaire with an insufficient column separator, from the 1997 Economic Census



Form WH-5087 Page 3

If not shown, please enter your 11-digit Census File Number from the address label on page 1 — Census File Number

Item 13. COMMODITY LINES

Report sales by commodity group either as a dollar figure or as a whole percent of total sales (Include the value of merchandise marketed under capital, finance, or full payout leases and rental receipts derived from merchandise under operating leases)

HOW TO REPORT PERCENTS: If figure is 38.76% of total sales → • Report whole percents: 39; Not acceptable: 38.76

Commodity lines	Census use	ESTIMATES are acceptable. Report dollars OR percents. Bil.	Mil.	Thou.	Dol.	Percent
1. Beauty and barber equipment and supplies	109	101				102
a. Equipment (furniture, dryers, etc.)	2511					
b. Supplies (combs, curlers, shampoos, etc.)	2512					
c. **Total** (Sum of lines 1a and 1b)	2500					
2. Custodial (janitors') equipment and supplies						
a. Custodial equipment – power	2521					
b. Custodial equipment – nonpower	2522					
c. Custodial supplies	2523					
d. **Total** (Sum of lines 2a through 2c)	2520					

Item 13. COMMODITY LINES – Continued

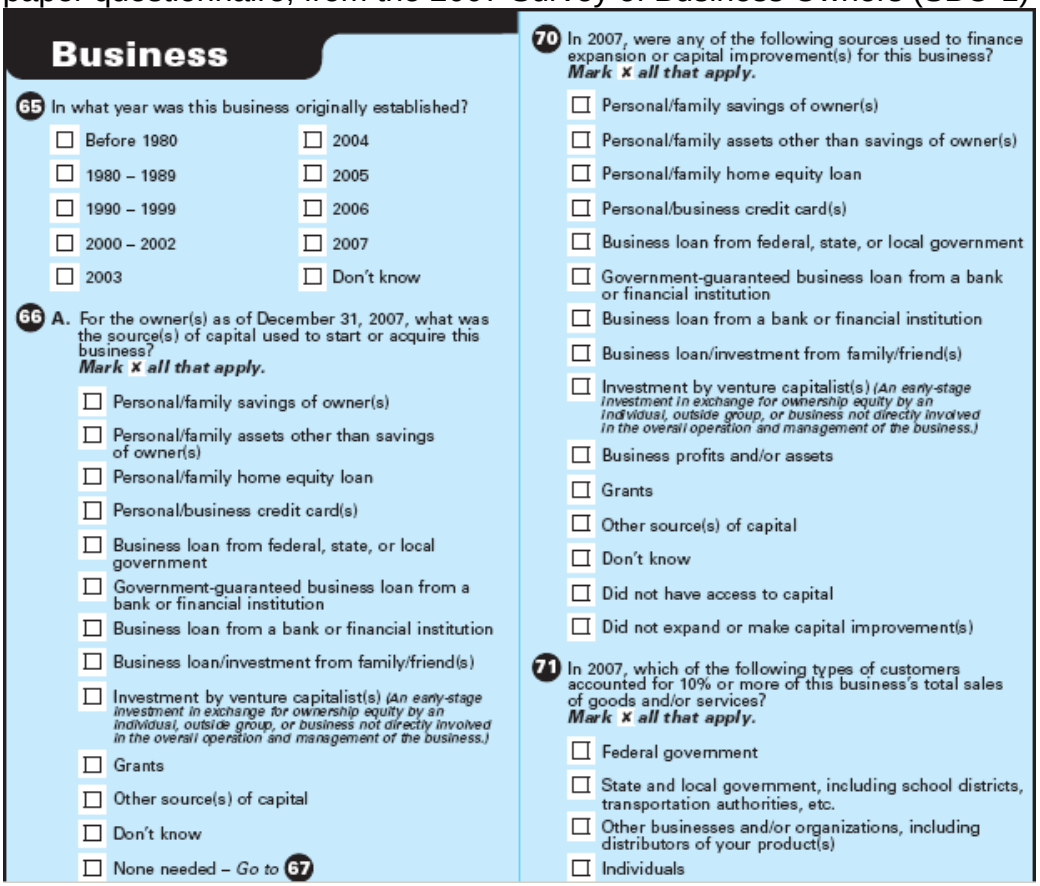
Commodity lines	Census use	ESTIMATES are acceptable. Report dollars OR percents. Bil.	Mil.	Thou.	Dol.	Percent
14. Printing and writing paper	3200					
15. General-purpose industrial machinery, equipment, and parts	2320					
16. Abrasives, strapping, tape, inks, and mechanical rubber goods	2460					
17. Floor coverings	0530					
18. Copper and brass	1200					
19. Piece goods, knit and woven	3600					
20. Flat iron and steel products	1120					
21. Iron and steel wire and wire products	1140					
22. Iron and steel pipe and tubing	1150					
23. Plastics materials and basic shapes	5300					
24. Wigs, yarns, and leather products	6150					
25. Miscellaneous commodities – *Specify*						

It is rare to use a two-column format for web surveys. However, a two-column format may sometimes be desirable in paper surveys when the survey consists of many shorter closed-ended questions with response options. In such cases, the two-column

format may help improve readability and allow for connections between the query and response options (Dillman, 2007). For example, the Survey of Business Owners asks for categorical information about the principal owners and the business itself. Due to printing costs, the questionnaire cannot be more than 8 pages long. A two-column format allows all of the questions to appear on the form without going over the page limit. However, because the survey provides a list of response options for each question, collects no numerical information, and does not require complex instructions, the two-column format works well for collecting this type of survey information. The visual separation employed by the SBO questionnaire between the two columns is a sufficient guide for the respondent (see Figure 28). The survey uses open space and a vertical line in a darker shade of the background color to indicate that respondents should move down the columns. The application of this idea to matrices is discussed in Section 8.2.

Another reason the SBO can effectively use two columns of questions is that the checkboxes are to the left of the response options, which keeps respondents' attention focused towards the left. In Figure 27, the answer space is to the right of the response option text; after providing an answer, respondents may be likely to continue across the page. In essence, the act of selecting a response and reporting that response on the Survey of Business Owners is less complex than it was for the 1997 Economic Census.

Figure 28. An example of effective visual separation of two columns of questions in a paper questionnaire, from the 2007 Survey of Business Owners (SBO-1)



Business

65 In what year was this business originally established?

- ☐ Before 1980
- ☐ 1980 – 1989
- ☐ 1990 – 1999
- ☐ 2000 – 2002
- ☐ 2003
- ☐ 2004
- ☐ 2005
- ☐ 2006
- ☐ 2007
- ☐ Don't know

66 A. For the owner(s) as of December 31, 2007, what was the source(s) of capital used to start or acquire this business?
Mark x all that apply.

- ☐ Personal/family savings of owner(s)
- ☐ Personal/family assets other than savings of owner(s)
- ☐ Personal/family home equity loan
- ☐ Personal/business credit card(s)
- ☐ Business loan from federal, state, or local government
- ☐ Government-guaranteed business loan from a bank or financial institution
- ☐ Business loan from a bank or financial institution
- ☐ Business loan/investment from family/friend(s)
- ☐ Investment by venture capitalist(s) *(An early-stage investment in exchange for ownership equity by an individual, outside group, or business not directly involved in the overall operation and management of the business.)*
- ☐ Grants
- ☐ Other source(s) of capital
- ☐ Don't know
- ☐ None needed – *Go to* **67**

70 In 2007, were any of the following sources used to finance expansion or capital improvement(s) for this business?
Mark x all that apply.

- ☐ Personal/family savings of owner(s)
- ☐ Personal/family assets other than savings of owner(s)
- ☐ Personal/family home equity loan
- ☐ Personal/business credit card(s)
- ☐ Business loan from federal, state, or local government
- ☐ Government-guaranteed business loan from a bank or financial institution
- ☐ Business loan from a bank or financial institution
- ☐ Business loan/investment from family/friend(s)
- ☐ Investment by venture capitalist(s) *(An early-stage investment in exchange for ownership equity by an individual, outside group, or business not directly involved in the overall operation and management of the business.)*
- ☐ Business profits and/or assets
- ☐ Grants
- ☐ Other source(s) of capital
- ☐ Don't know
- ☐ Did not have access to capital
- ☐ Did not expand or make capital improvement(s)

71 In 2007, which of the following types of customers accounted for 10% or more of this business's total sales of goods and/or services?
Mark x all that apply.

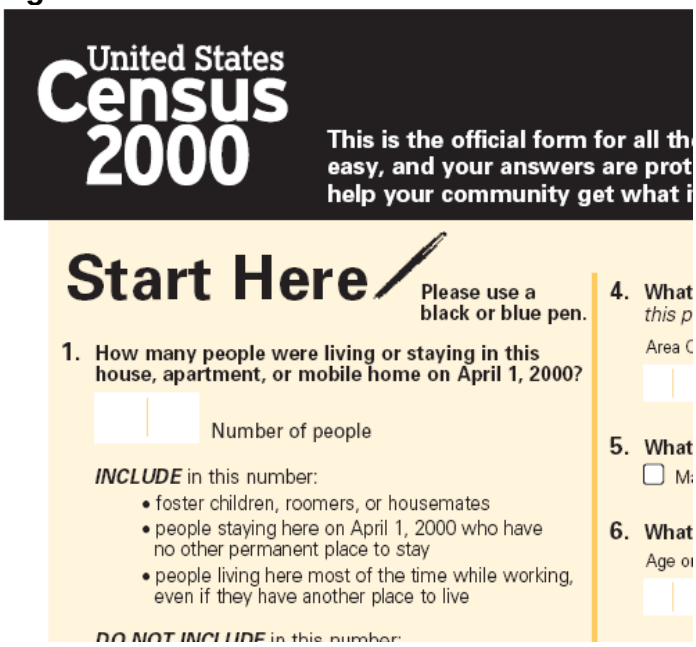
- ☐ Federal government
- ☐ State and local government, including school districts, transportation authorities, etc.
- ☐ Other businesses and/or organizations, including distributors of your product(s)
- ☐ Individuals

Finally, using a booklet format in paper surveys can also help respondents easily navigate among pages because this format closely resembles a book, where pages are read from the top left to the bottom right (Dillman, 2000).

6.2 Clearly identify the start of each question and section.

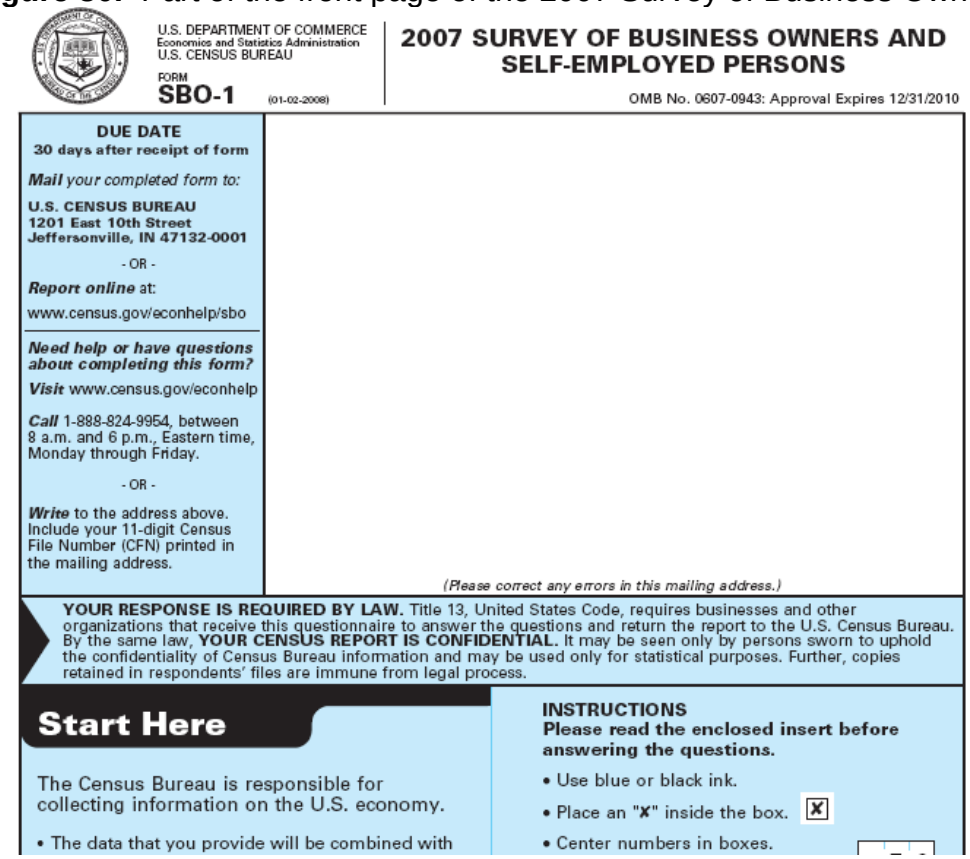
Some survey programs choose to point out the beginning of the questionnaire by using a "Start Here" header (see Figure 29 for an example from the 2000 Decennial Census).

Figure 29. The "Start Here" header from the 2000 Decennial Census



While this does clearly indicate where the questions begin, if there are instructions placed prior to the header, there is a risk that respondents will not read or pay attention to them. Cognitive testing with respondents to the Survey of Business Owners indicated that many of them did not read the instructions prior to the "Start Here" header (see Figure 30). Skipping over that information means that respondents tended not to read the statements about the confidentiality of the data and the mandatory nature of the survey. They also risked missing the due date, which is at the upper-left corner of the page.

Figure 30. Part of the front page of the 2007 Survey of Business Owners questionnaire



U.S. DEPARTMENT OF COMMERCE
Economics and Statistics Administration
U.S. CENSUS BUREAU

FORM
SBO-1 (01-02-2008)

2007 SURVEY OF BUSINESS OWNERS AND SELF-EMPLOYED PERSONS

OMB No. 0607-0943: Approval Expires 12/31/2010

DUE DATE
30 days after receipt of form

Mail your completed form to:

U.S. CENSUS BUREAU
1201 East 10th Street
Jeffersonville, IN 47132-0001

- OR -

Report online at:
www.census.gov/econhelp/sbo

Need help or have questions about completing this form?

Visit www.census.gov/econhelp

Call 1-888-824-9954, between 8 a.m. and 6 p.m., Eastern time, Monday through Friday.

- OR -

Write to the address above. Include your 11-digit Census File Number (CFN) printed in the mailing address.

(Please correct any errors in this mailing address.)

YOUR RESPONSE IS REQUIRED BY LAW. Title 13, United States Code, requires businesses and other organizations that receive this questionnaire to answer the questions and return the report to the U.S. Census Bureau. By the same law, **YOUR CENSUS REPORT IS CONFIDENTIAL.** It may be seen only by persons sworn to uphold the confidentiality of Census Bureau information and may be used only for statistical purposes. Further, copies retained in respondents' files are immune from legal process.

Start Here

The Census Bureau is responsible for collecting information on the U.S. economy.

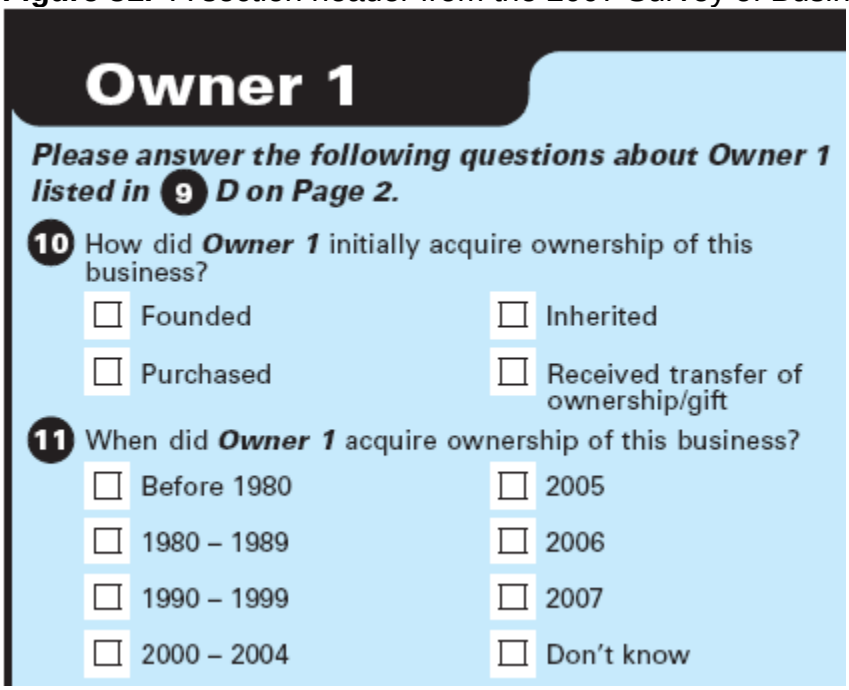
- The data that you provide will be combined with

INSTRUCTIONS
Please read the enclosed insert before answering the questions.

- Use blue or black ink.
- Place an "X" inside the box. ☒
- Center numbers in boxes.

Within questionnaires, there are often sections of related questions. For instance, there may be several data items that collect information about employees or payroll. Sections may be used to help respondents recognize that groups of questions are related, discern the basic organization of information in the survey, and understand what is being asked of them. Section headings can help respondents identify that the information being requested is somewhat different than in the last section. To help respondents notice the section headings in the early stages of visual processing (Ware, 2004), section headings in Figure 5 on page 19 were made more prominent using reverse print with a dark blue background and white text. The 2007 Survey of Business Owners (Figure 31) and the 2007 Census of Governments Survey of Locally-Administered Public-Employee Retirement Systems (Figure 32) used similar techniques.

Figure 31. A section header from the 2007 Survey of Business Owners



Owner 1

Please answer the following questions about Owner 1 listed in 9 D on Page 2.

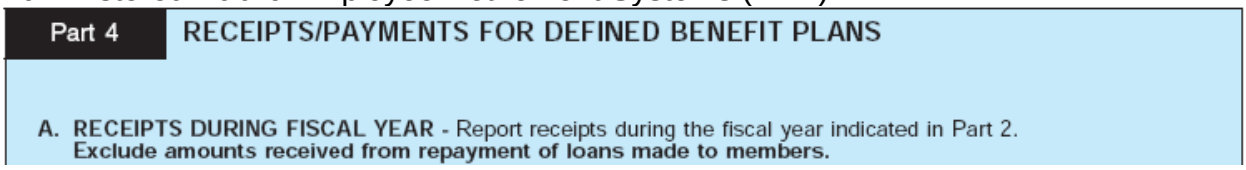
10 How did ***Owner 1*** initially acquire ownership of this business?

- ☐ Founded
- ☐ Inherited
- ☐ Purchased
- ☐ Received transfer of ownership/gift

11 When did ***Owner 1*** acquire ownership of this business?

- ☐ Before 1980
- ☐ 1980 – 1989
- ☐ 1990 – 1999
- ☐ 2000 – 2004
- ☐ 2005
- ☐ 2006
- ☐ 2007
- ☐ Don't know

Figure 32. A section header from the 2007 Census of Governments Survey of Locally-Administered Public-Employee Retirement Systems (F-11)



Part 4 RECEIPTS/PAYMENTS FOR DEFINED BENEFIT PLANS

A. **RECEIPTS DURING FISCAL YEAR** - Report receipts during the fiscal year indicated in Part 2. **Exclude amounts received from repayment of loans made to members.**

Once respondents begin the task of answering each question, it is important to clearly identify questions using numbers or some other consistently applied font or symbol. This can help respondents know where to start each topical area as well as aiding movement from one question to the next. In addition to improving the alignment in the redesigned form in Figure 5 on page 19, question numbers were highlighted using reverse print with a dark background and white text to help respondents clearly identify the start of each question. The same numbering device was employed in Figure 31, from the 2007 Survey of Business Owners. The use of question numbers can also be particularly helpful in economic surveys where respondents often move back and forth between the paper and web versions (Dowling, 2006) so the numbers can help orient respondents to ensure they are providing their response to the correct question.

Questions should be numbered consecutively from beginning to end. When a survey program has multiple versions of a questionnaire, and they wish to keep the numbering consistent across instruments, "NA bands" may be employed, such as those used by the economic census (see Figure 33). Doing so indicates to the respondent that they are not expected to provide information to certain questions.

Figure 33. Example of an "NA band" from the 2007 Economic Census


25 EXPORTED SERVICES

NOTE *- An exported service is a product (e.g., service performed, license agreement) that is performed for, or sold or transferred to, a customer or client (individual, government, business establishment, etc.) located* ***outside*** *the United States (i.e., outside the 50 States, District of Columbia, U.S. Commonwealth Territories, or U.S. possessions). Include products provided to unaffiliated and affiliated foreign firms (e.g., foreign parent firms, subsidiaries, branches). Exclude products provided to domestic subsidiaries of foreign firms.*

A. Did the receipts or revenue (reported in 5) include any amounts for exported services?

0911 ☐ Yes - *Go to line B*

0912 ☐ No - *Go to* 30

2007

$ Bil.	Mil.	Thou.	Dol.

B. Amount of receipts or revenue for exported services 0914

26–29 Not Applicable.

6.3 Group similar data items together.

Spacing is a particularly effective organizational tool that can help to establish groupings. As the Gestalt principle of proximity states, visual elements located closer together are perceived to be a group and more related to one another than elements placed further apart (Lidwell *et al.*, 2003; Ware, 2004). One of the most powerful ways to emphasize that elements are related is to place them in close proximity, as this will often overpower other competing visual cues (Ware, 2004).

In the 1997 Economic Census, questionnaires were arranged on legal-sized pages, in one or two columns. A segment of one of the forms is shown in Figure 27 on page 38. The preponderance of lines found on the page was problematic. Lines separated items that needed to be grouped together, for instance lines 1a-1c. In fact, the lines serve to separate what the visual cue of the indented, outline format tried to create – an indication that there are subparts within the item. The presence of the lines between items 1a-1c violates the Gestalt principle of proximity and could have prevented respondents from realizing that these items were related.

For the 2002 Economic Census, the questionnaires had only one column on each page, rather than two, which eased the problem with navigation. Lines between data items were removed. Between these two significant visual design changes, the indented, outline format (used to indicate subparts within an item) was more evident.

6.4 Use blank space to separate questions and make it easier to navigate within questionnaires.

The Gestalt principle of proximity suggests that things that are visually close together are seen as part of the same group (Jenkins and Dillman, 1997). This is the basis of an interpretive heuristic identified by Tourangeau *et al*. (2004) as "near means related." As a general rule, individual questions consist of the query, any needed instructions, and response spaces or categories (Dillman, 2000). When answer spaces for a question

get placed equidistant between the query for one question and that for a succeeding question, it is sometimes difficult to tell to which query the answer spaces belong (Dillman, 2000). It follows that the spacing between a query and its answer categories should be less than the spacing between the answer space and the beginning of the next question. Figure 21 on page 32 shows how spacing can be used effectively to separate questions from each other. The space between the last two items in question 5 is less than the space between the last item in question 5 and the query in item 6.

The design challenge for incorporating blank space is to use it in a way that helps respondents identify and group information that is related, and to keep respondents from grouping the wrong information when attempting to understand or respond to a question. Since respondents view information that is spatially close together as being related (Lidwell *et al.*, 2003; Ware, 2004), it is disadvantageous to spread out related information on a page or screen simply to fill the "empty" space. While it may help make the page less cluttered, it actually results in respondents not understanding which items are related. It is similarly disadvantageous to limit the space between items in order to save space on the page (Dillman *et al.*, 2005). Not only does this make the page harder to process, due to the condensed space between items, but again causes the respondent to misinterpret which items are related.

6.5 Align questions and answer spaces / response options.

Related to the Gestalt principle of proximity is the principle of good continuation where visual elements arranged along a straight line are more likely to be perceived as a group and more related to one another than elements not placed along a common line (Lidwell *et al*., 2003; Ware, 2004). Aligning questions and their subcomponent parts so they line up along common rows or columns, as shown in Figure 34, is a powerful design tool to help guide respondents as they complete the survey. It is particularly helpful to align answer spaces so respondents can easily identify where to report their responses. The example in Figure 5 on page 19 shows that question numbers, questions, answer spaces and individual units (the set of three zeros, to indicate that data was to be rounded to thousands) were aligned to help visually establish a clear navigational path.

Figure 34. Vertical alignment of response options, from the Annual Survey of Government Employment (E-4), Harvester version.

An example of slightly misaligned answer spaces comes from the 2007 Service Annual Survey, item 11 (Figure 35), where changes in the organization's structure are reported. While the areas for name and address align vertically, the answer spaces for both EIN items are indented a bit from the remaining answer spaces. In addition, the answer spaces for respondents to specify the nature of the change in structure is aligned with the yes/no response options, instead of the other answer spaces. As a result, it is unclear that the answer space for specification is only to be completed as part of the follow-up to the "yes" response option. To bring the answer spaces into alignment, the answer spaces for EIN could be moved to the left, and the answer space for the specification could be moved to the right. Additionally, the vertical height could be increased so that the specification answer space does not become too small.

An example of aligned answer spaces from a similar question can be seen in Figure 36, from Statistics New Zealand's Biotechnology Survey from 2005. The follow up data that is to be provided only by respondents who answer "no" can be found below or to the right of the "no" response option. The response options to the follow up question are aligned with the text "the period covered…" In addition, the place where respondents specify details is not stretched fully across the page, but rather indented so it does not get in the way of people who answered "yes" and are working their way to the following item.

Figure 35. Slightly misaligned answer spaces, 2007 Service Annual Survey (SA-62T)

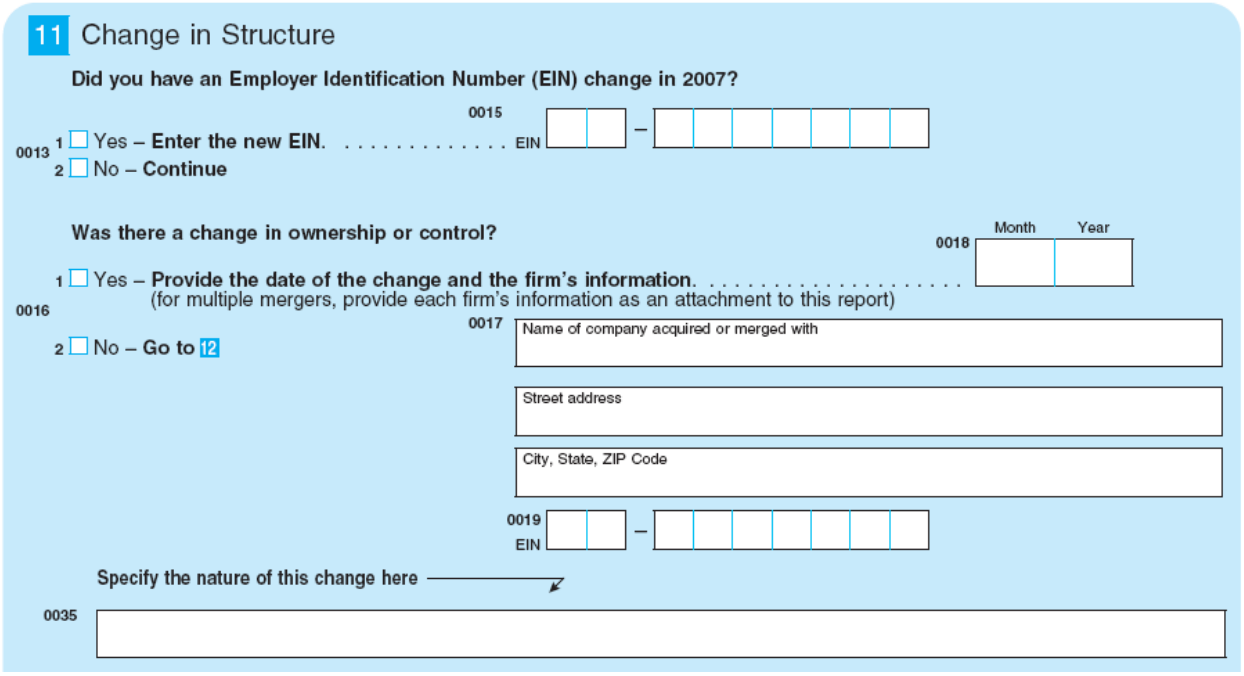
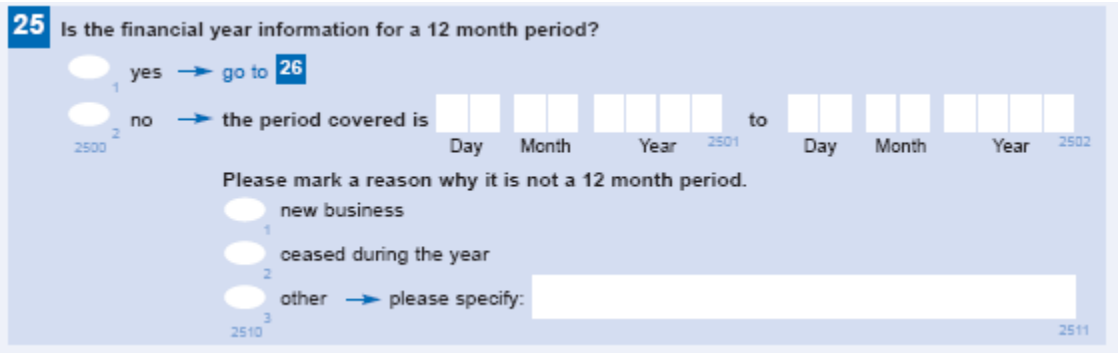


Figure 36. Aligned answer spaces, from Statistics New Zealand's Biotechnology Survey 2005.



Aligning response options in one single column below the question (Figure 37) is preferable to listing them in multiple columns (Figure 38). By putting response options in a single column, they are visually located together in a single group, thus taking advantage of the Gestalt principle of proximity. In addition, starting new lines on the left side is consistent with the way English-speaking respondents read. The visual separation of response options into multiple columns effectively increases the space between options, and increases the risk that some options will be missed. Also, some respondents may process the list horizontally and then vertically while others may process the list vertically and then horizontally, potentially leading to confusion.

Figure 37. An example of response options arranged in the preferred layout – a single column – from the 2007 Economic Census (FI-52101)

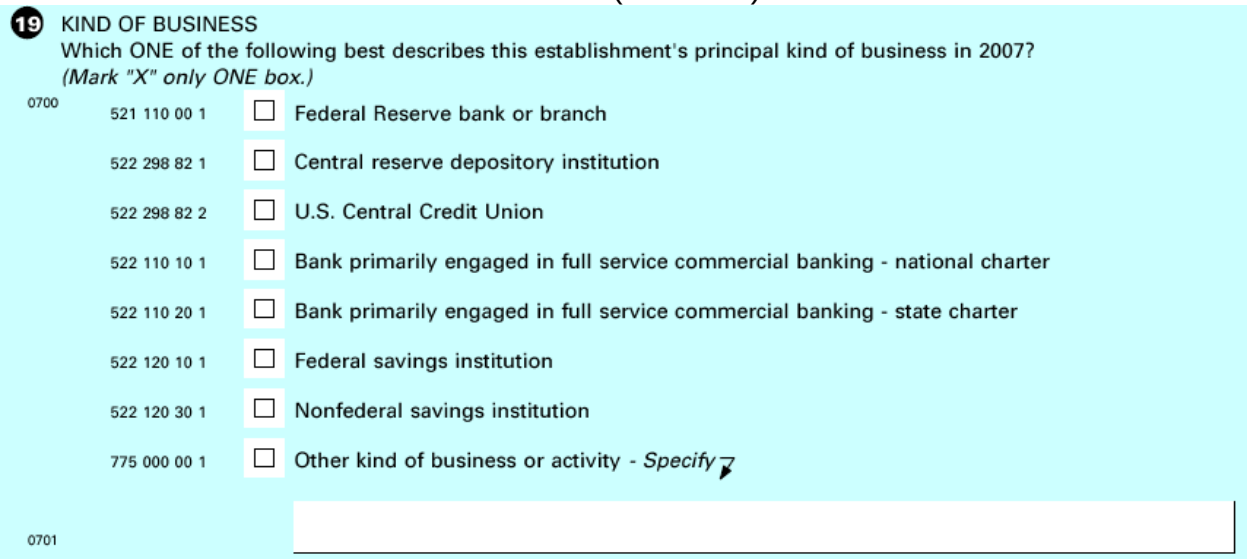
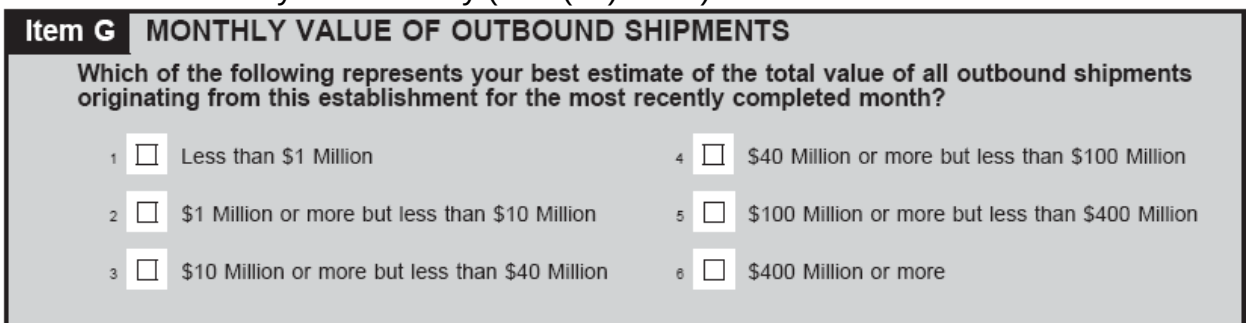


Figure 38. An example of response options arranged in a less than ideal layout, from the 2007 Commodity Flow Survey (CFS(07)-1000).

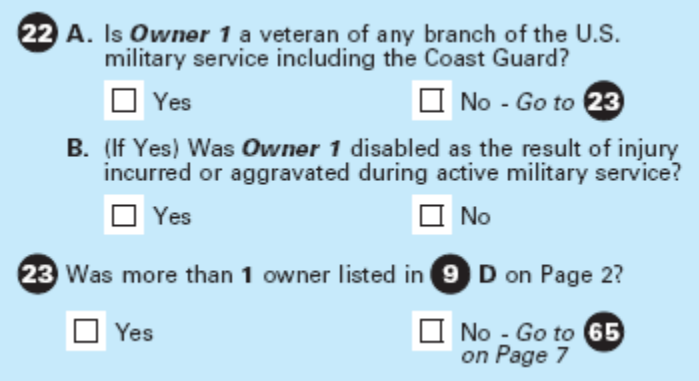


6.6 Use strong visual features to emphasize skip instructions.

Survey designers often need to interrupt the navigational flow to indicate a change in what is being asked of respondents. Often, this is necessary in the event that an answer to a certain question allows the respondent to skip over one or more questions. For example, survey designers often want to ask follow-up questions that only apply to a subset of respondents based on their responses to previous questions. Although the computer can correctly execute branching instructions in web surveys, strong visual guides are needed to help respondents accurately comply with branching instructions in paper surveys. Redline *et al.* (2003) found that a combination of techniques – including the use of an arrow, bolded instructions so that there was more contrast between them and response options, and the addition of parenthetic information at the beginning of the following question (*e.g.*, "(If Yes…)") – in the 2000 Decennial Census significantly improved the number of respondents correctly executing the skip instructions.

The 2007 Survey of Business Owners used some of these techniques for skip instructions on their paper questionnaire, as seen in Figure 39. The text of the skip instruction is located right next to the text of the response option "No." The font variation changed from the plain text of the response option to the italicized skip instruction. The question number to which the respondent is supposed to skip is formatted the same way it appears later in the questionnaire, so that respondents may find it more easily. In addition, a parenthetical instruction "(If Yes)" was added at the beginning of item 22B, to reinforce that only certain respondents should answer the question, based on their response to 22A.

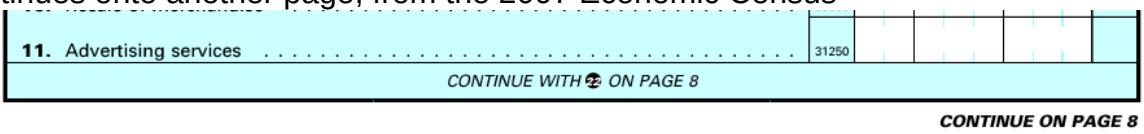
Figure 39. Example of skip instructions on the 2007 Survey of Business Owners (SBO-1).

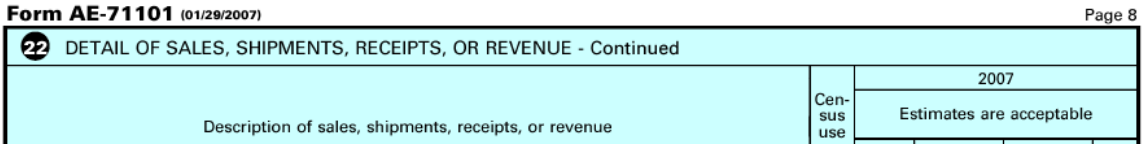


6.7 Inform respondents of the navigational path when a question continues on another page.

Ideally, related questions will all appear on one page, rather than carry from one page to another. However, this is sometimes not possible, and cramming information on a page for the sake of making it fit is less than desirable (Mangione, 1995; Dillman *et al*., 2005). When questions need to continue onto subsequent pages, it is necessary to clearly indicate to respondents that this is the case. Otherwise, respondents might not realize that more options and details are available. Various 2007 Economic Census paper questionnaires had lengthy lists of kind of business codes and details of sales/revenue. When a question continued onto the next page, there was a banner at the bottom of the page that said "Continue with [item number] on page [page number]." At the top of the following page, the section header was repeated, along with the word "Continued." See Figure 40 for an example.

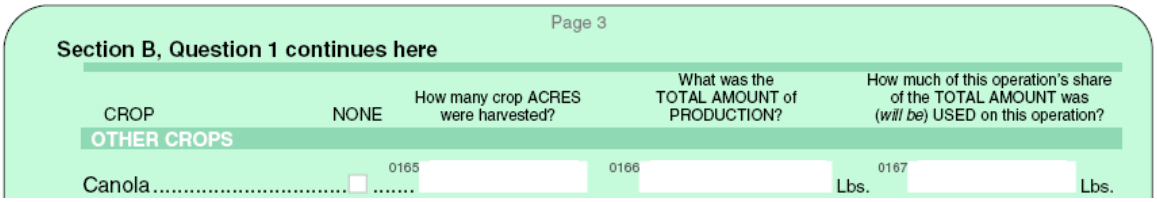
Figure 40. The bottom of one page and the top of the next, indicating that a question continues onto another page, from the 2007 Economic Census





The Agricultural Resource Management Survey, conducted by the National Agricultural Statistical Service, uses a similar technique, but the display is a bit different, as shown in Figure 41. That questionnaire right-justifies the continuation text at the bottom of the page indicating that the question continues, and adds an arrow to that effect. Notice, also, that at the top of the next page, the header reads, "Section B, Question 1 continues here." Though the text differs from that used by the 2007 Economic Census, a similar effect is achieved.

Figure 41. The bottom of one page and the top of the next, indicating that a question continues onto another page, from the 2005 Agricultural Resource Management Survey



7. Guidelines on Instructions

Converse and Presser (1986) discuss the difficulties in building a common frame of reference between respondents and survey researchers, and the necessity of doing so. They also state that how to go about writing clear definitions is not obvious, and no

"general prescription" is likely, though they recommend that researchers pay attention and gather data or experiences that might assist in the endeavor. Finally, they acknowledge that getting respondents to use a common frame of reference is more difficult than providing one.

The use of instructions in surveys is one mechanism for providing a common frame of reference. Particularly in economic surveys, the instructions are often very important for conveying the correct specifications or intent of the question, as they may contain information on the definition of the reporting unit, specific items to include or exclude in the response, and other types of instructional material. Respondents frequently do not refer to words they believe to be extraneous, including instructions or words located within parentheses. Respondents tend to believe they understand exactly what the question is asking, or that they already know the answer without further clarification; as a result, they might miss information that refines the question's intent (Gower, 1994). Visual design can be used to call attention to instructions that respondents might otherwise ignore.

7.1 Incorporate question-specific instructions into the survey instrument where they are needed. Avoid placing instructions in a separate sheet/booklet/webpage.

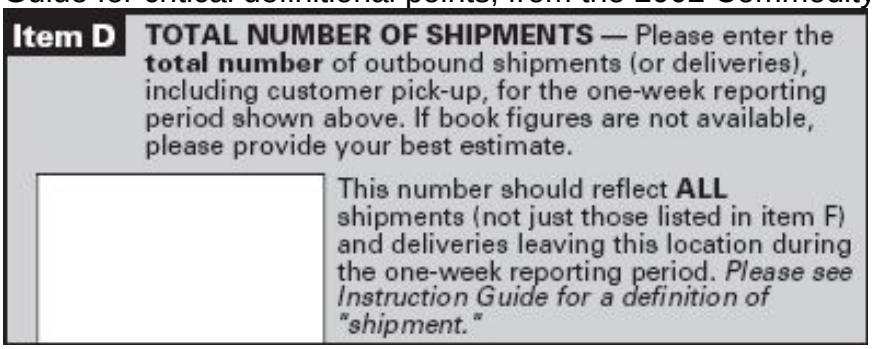
Going from the middle of a questionnaire to a separate instruction book in order to find a definition or some other piece of information needed for answering that question requires initiative on the part of the respondent. Cognitive testing with respondents has demonstrated that to the extent that instructions are separated from the questions, respondents are less likely to look for them, look at them, or use them in formulating a response to the question presented. Dillman (2000) mentions the varying degree in respondents' usage of separate instruction booklets, "resulting in some respondents being subjected to different stimuli than are others" (p. 100).

The likelihood of a respondent using instructions is greater when they are located with the question (Gower, 1994). Christian and Dillman (2004) found that placing information directly in the navigational path at the location where it is to be used improves the likelihood that respondents will use that information. Research on web surveys (Tourangeau, 2007; Conrad *et al*., 2006) reveals that the greater the effort respondents have to make to find instructions *e.g.*, the more clicks they must make in order to find information, the less likely they are to use them. As a result, we recommend that instructions be placed between the question and the answer space.

An economic survey example of poor instruction placement can be found in the 2002 Commodity Flow Survey (CFS), an eight-page questionnaire accompanied by a separate eight-page instruction guide. One of the most critical questions on the survey asked for the total number of outbound shipments made by the establishment during a one-week reporting period (Figure 42). Cognitive testing showed that respondents defined "shipment" significantly differently from the survey program (Barnett *et al*., 2006). Though some important pieces of the definition were shown with the question,

other pieces were located in the separate instruction booklet (see Figure 43), leading to an underestimate in the number of outbound shipments.

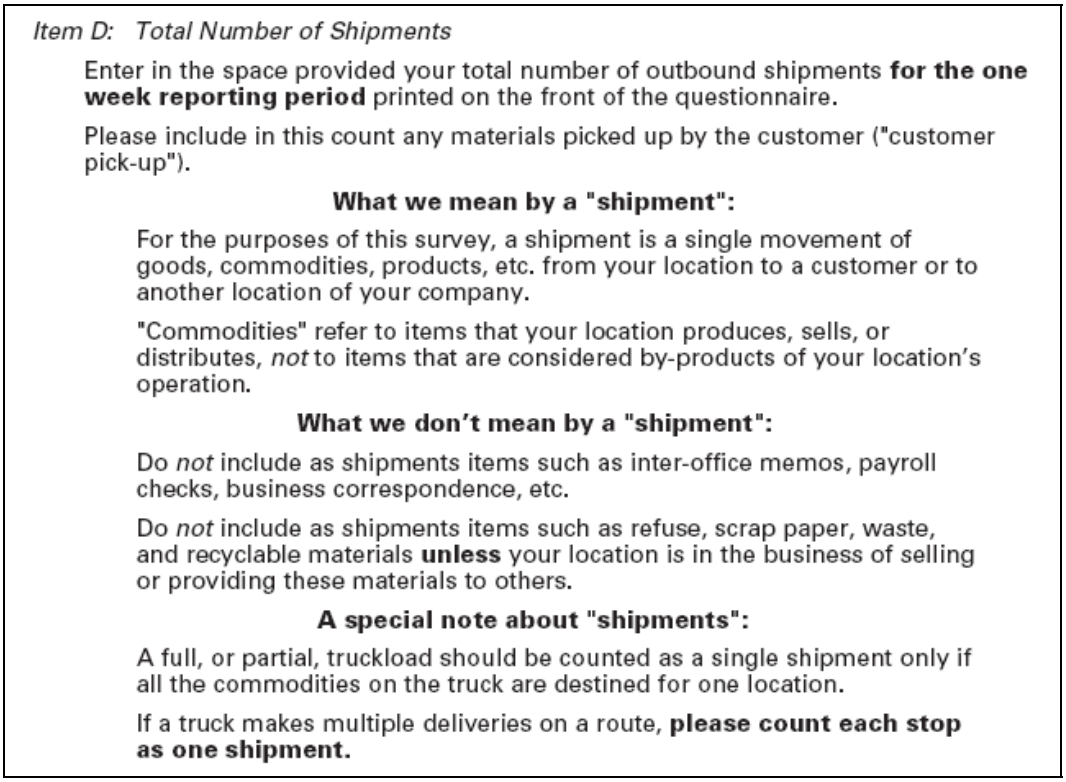
Figure 42. An example in which respondents are directed to the separate Instruction Guide for critical definitional points, from the 2002 Commodity Flow Survey



Item D **TOTAL NUMBER OF SHIPMENTS** — Please enter the **total number** of outbound shipments (or deliveries), including customer pick-up, for the one-week reporting period shown above. If book figures are not available, please provide your best estimate.

This number should reflect **ALL** shipments (not just those listed in item F) and deliveries leaving this location during the one-week reporting period. *Please see Instruction Guide for a definition of "shipment."*

Figure 43. 2002 Commodity Flow Survey: excerpt containing definition of "shipment" from the Instruction Guide.



Item D: Total Number of Shipments

Enter in the space provided your total number of outbound shipments **for the one week reporting period** printed on the front of the questionnaire.

Please include in this count any materials picked up by the customer ("customer pick-up").

What we mean by a "shipment":

For the purposes of this survey, a shipment is a single movement of goods, commodities, products, etc. from your location to a customer or to another location of your company.

"Commodities" refer to items that your location produces, sells, or distributes, *not* to items that are considered by-products of your location's operation.

What we don't mean by a "shipment":

Do *not* include as shipments items such as inter-office memos, payroll checks, business correspondence, etc.

Do *not* include as shipments items such as refuse, scrap paper, waste, and recyclable materials **unless** your location is in the business of selling or providing these materials to others.

A special note about "shipments":

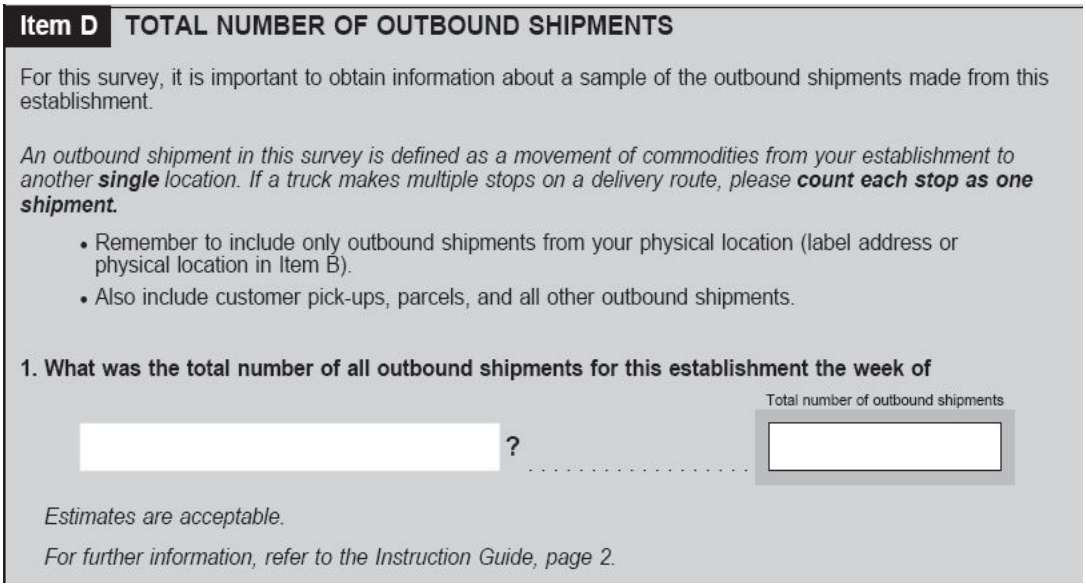
A full, or partial, truckload should be counted as a single shipment only if all the commodities on the truck are destined for one location.

If a truck makes multiple deliveries on a route, **please count each stop as one shipment.**

For the 2007 CFS, the most critical information about the definition of "shipment" was moved to the questionnaire (see Figure 44), immediately prior to the question. Respondents were directed to a specific location within the separate instruction guide for further assistance ("For further information, refer to the Instruction Guide, page 2."), where they found examples of things to be included or excluded in the response, rather than critical definitional points.

As part of the redesign of the Bureau of Economic Analysis' quarterly foreign direct investment questionnaire, a significant change involving instructions was made. Rather than putting question-specific instructions in a separate booklet, they were placed on the facing page opposite from the questions. In the new design, questions were generally placed on the right side of two facing pages, while the appropriate instructions for those questions were placed on the left side. An example of two facing pages can be found in Appendix B. Results from cognitive testing showed that this placement of instructions was more easily accessible to respondents, and encouraged them to read and pay attention to them (Tuttle and Morrison, 2007; Tuttle *et al*., 2007).

Figure 44. 2007 Commodity Flow Survey: total number of outbound shipments item, which did include critical definitional points, and a reference to a specific location within the Instruction Guide.



Item D **TOTAL NUMBER OF OUTBOUND SHIPMENTS**

For this survey, it is important to obtain information about a sample of the outbound shipments made from this establishment.

*An outbound shipment in this survey is defined as a movement of commodities from your establishment to another **single** location. If a truck makes multiple stops on a delivery route, please **count each stop as one shipment.***

- Remember to include only outbound shipments from your physical location (label address or physical location in Item B).
- Also include customer pick-ups, parcels, and all other outbound shipments.

1. What was the total number of all outbound shipments for this establishment the week of

? . . . . . Total number of outbound shipments

Estimates are acceptable.

For further information, refer to the Instruction Guide, page 2.

When a paper instrument is put into an electronic environment, it is important to note that if the instructions appeared with the questions on the paper version, they should also appear with the question (not with a help link) in the electronic version. The mode guidelines that are used for the 2010 Decennial Census and American Community Survey refer to this as "universal presentation." While it may seem that this concept means that instructions should be identical across modes, that assumption might not be correct. Rather, universal presentation says "the meaning and intent of the question and response options must be consistent…the goal is that instruments collect equivalent information regardless of mode…that the same respondent would give the same substantive answer to a question regardless of the mode of administration" (Martin *et al*., 2007).

If a questionnaire's separate instruction booklet is completely eliminated, it is possible that the instructional information that appears with a question will be much longer than it is currently. The next guideline, found in Section 7.2, discusses one way to address this concern. As always, there is a trade-off involved, and a balance must be struck

between potentially overwhelming the respondent with information and instructions, the limitations of page and screen size, the location of instructions, and the costs associated with printing, assembling, mailing, and processing questionnaires. Though our recommendation is to generally place the instructions between the question and the answer space, this may not always be feasible. As a result, instructions may need to be placed below the question and answer space, so that the query and answer space are not separated by a visually insurmountable distance such that the respondent has a difficult time finding the space where they are to record their data.

7.2 Consider reformulating important instructions as questions.

Survey instruments in the Economic Directorate often contain general – rather than question-specific – reporting instructions prior to the first question. These instructions, for example, may inform the respondent that certain parts of a company or establishment should be included or excluded from the responses they provide on the questionnaire.

One way of increasing the likelihood of getting people to attend to these types of instructions is to convert them into questions (Willimack, 2005). This method worked for the Bureau of Economic Analysis' quarterly foreign direct investment questionnaire, especially for defining the reporting unit. The questionnaire requires respondents to consolidate their corporate entities in a different way than they normally would. Under the previous design, the definition of the reporting unit took up nearly one-quarter of the separate instruction booklet, where respondents seemed to rarely read it, based upon observed reporting errors and results from respondent debriefings. By converting these reporting unit instructions into questions, and assigning item numbers to them, respondents paid attention to these points, answered the questions, and were able to correctly consolidate their reporting unit (Tuttle *et al*., 2007).

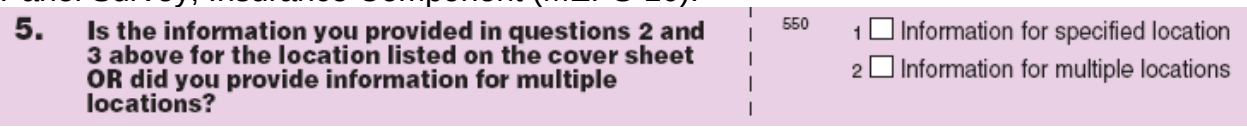
Converting instructions into questions might simply be a matter of adjusting the words in a sentence, adding a question mark, and an instruction of what respondents need to do based on their response to the question. For instance, on the 2007 Annual Retail Trade Survey for department stores (Form SA-44), respondents are instructed to include "retail leased departments and concessions operated by this firm in establishments of others (*e.g.*, shoe departments in department stores or prescription counters in food stores) which report payroll under this firm's current EIN shown in Item 1A." One way to convert that instruction to a question might look like this:

> Does your firm operate any retail leased departments or concessions in establishments of others which report payroll under your firm's EIN, reported in [insert question number] (for example, shoe departments in department stores or prescription counters in food stores)?
>
> ☐ Yes – Include the data for these facilities in this report
> ☐ No

Another reason to convert instructions into questions is to help clarify or correct reported

data, thus assisting the processing staff in adjusting reported data to meet the requirements for analysis. For example, in the Medical Expenditures Panel Survey – Insurance Component (MEPS-IC), respondents are instructed to report information only for the location identified on the cover page of the survey. As a way of identifying which respondents reported incorrectly, the 2004 MEPS questionnaire asked a question about whether data reported in previous questions included information for the desired reporting unit that was the location specified on the cover sheet rather than multiple locations (see Figure 45).

Figure 45. A question that clarifies reported data, from the 2004 Medical Expenditure Panel Survey, Insurance Component (MEPS-10).



When converting instructions into questions, it is important to keep the guidelines on wording in mind. Efforts should still be made to keep the question as simple and straightforward as possible. We recommend referring to Section 4 for additional guidance. Finally, if instructions are converted to questions, it may be necessary to balance the (perceived) burden of additional questions with improved data quality. The number of questions respondents answer is not the sole determinant of burden, though it is a factor. While additional questions may cause the form to look longer, it is not necessarily true that it will require more time to complete. According to the Office of Management and Budget (OMB), respondent burden refers not only to the time it takes to answer questions but also to read instructions and gather data. The time added by reading additional questions is generally much less than the time it takes respondents to read through and interpret lengthy instructions. Therefore, the overall burden may be reduced and the quality of the data from respondents may improve as a result of their attention to questions derived from instructions to which they had not previously attended.

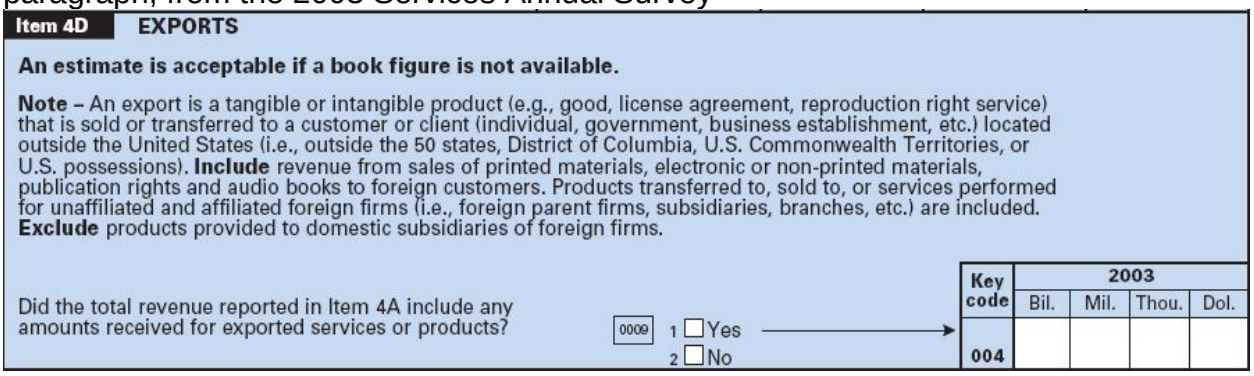
7.3 Convert narrative paragraphs to bulleted lists.

Instructions are often written in the form of long, narrative paragraphs, which respondents tend to skim over rather than read carefully. Gernsbacher (1990) demonstrates that readers spend more time on the initial sentences of paragraphs, indicating that later sentences, and the details contained therein, receive less attention. Thus, by using bulleted lists, the number of initial sentences is effectively increased, so the details receive more attention than if they were located within a paragraph. Furthermore, bulleted lists encourage reading, because the density of text is reduced, and becomes less intimidating.

In the 2003 Services Annual Survey, respondents were asked about revenue from exports (Figure 46). The question was hidden below a long paragraph that defined what an export was, as well as what elements were to be included in and excluded from

the response. When the survey underwent a significant redesign, one change involved splitting the paragraph into pieces, and adding bullets for the include and exclude lists (Figure 47).

Figure 46. Instructions displayed in a less-than-ideal design, using a long narrative paragraph, from the 2003 Services Annual Survey



Item 4D **EXPORTS**

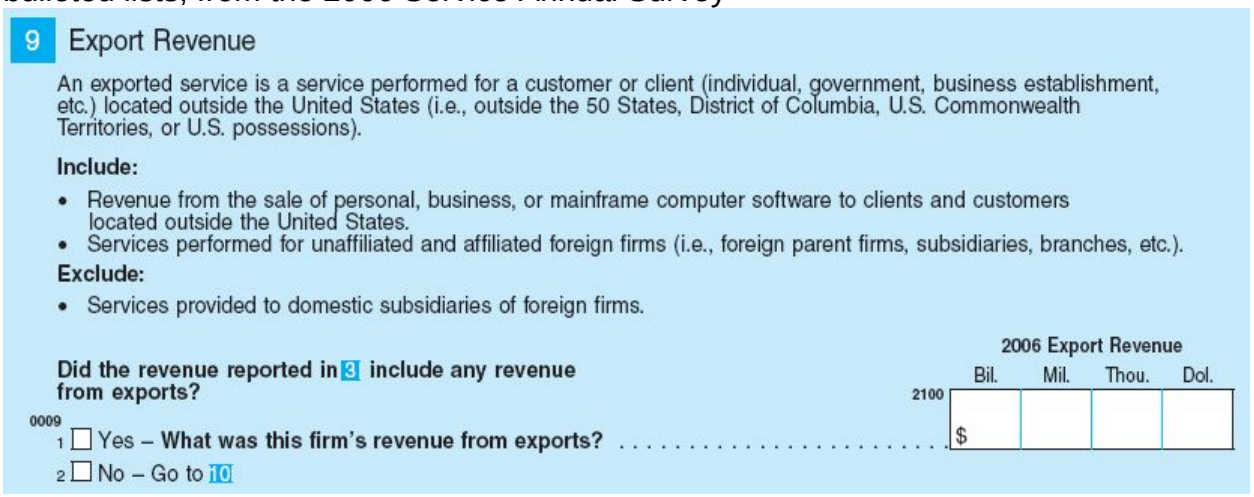
An estimate is acceptable if a book figure is not available.

Note – An export is a tangible or intangible product (e.g., good, license agreement, reproduction right service) that is sold or transferred to a customer or client (individual, government, business establishment, etc.) located outside the United States (i.e., outside the 50 states, District of Columbia, U.S. Commonwealth Territories, or U.S. possessions). **Include** revenue from sales of printed materials, electronic or non-printed materials, publication rights and audio books to foreign customers. Products transferred to, sold to, or services performed for unaffiliated and affiliated foreign firms (i.e., foreign parent firms, subsidiaries, branches, etc.) are included. **Exclude** products provided to domestic subsidiaries of foreign firms.

Did the total revenue reported in Item 4A include any amounts received for exported services or products? 0009 1 ☐ Yes → 2 ☐ No

Key code	2003 Bil.	Mil.	Thou.	Dol.
004				

Figure 47. Instructions displayed with a better design, using shorter statements and bulleted lists, from the 2006 Service Annual Survey



9 Export Revenue

An exported service is a service performed for a customer or client (individual, government, business establishment, etc.) located outside the United States (i.e., outside the 50 States, District of Columbia, U.S. Commonwealth Territories, or U.S. possessions).

Include:

- Revenue from the sale of personal, business, or mainframe computer software to clients and customers located outside the United States.
- Services performed for unaffiliated and affiliated foreign firms (i.e., foreign parent firms, subsidiaries, branches, etc.).

Exclude:

- Services provided to domestic subsidiaries of foreign firms.

Did the revenue reported in 3 include any revenue from exports?

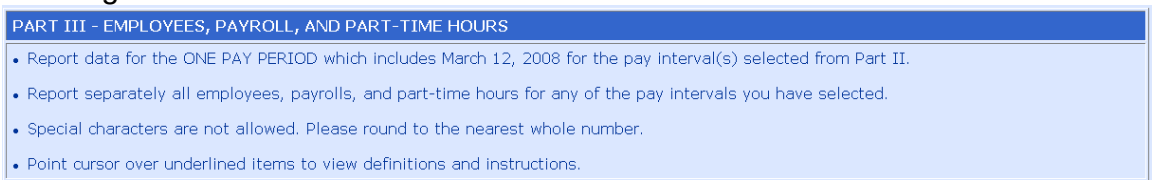
0009
1 ☐ Yes – **What was this firm's revenue from exports?** . . . . . .
2 ☐ No – Go to 10

2006 Export Revenue

	Bil.	Mil.	Thou.	Dol.
2100	$			

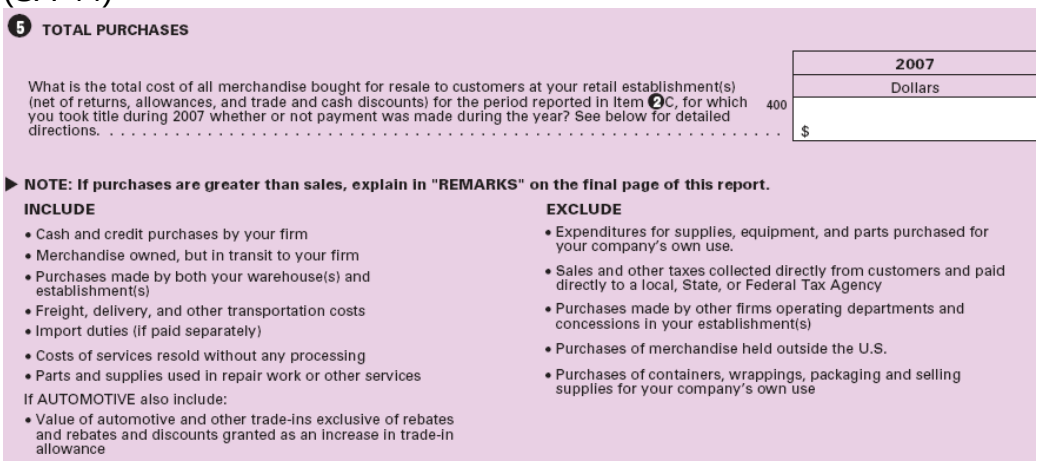
The Annual Survey of Government Employment (E-4) asks respondents to report data for the pay period including March 12 and corresponds to the pay interval (*e.g.*, monthly, biweekly) that they reported earlier in the survey. In the Harvester version of this survey, these instructions are displayed in a bulleted list, along with Harvester-specific instructions about the use of special characters, the unit of measure, and the location of definitions (see Figure 48).

Figure 48. Annual Survey of Government Employment (E-4), Harvester version, showing bulleted lists of instructions.



Ideally, the text for each bullet should be succinct, only a few words and not more than a sentence, though this may not always be possible. The include and exclude lists for the total purchases question from the 2007 Annual Retail Trade Survey (Form SA-44, Figure 49) shows succinct bulleted text.

Figure 49. Succinct text within bullets, from the 2007 Annual Retail Trade Survey (SA-44)



7.4 When possible, use an actual date, rather than a vague timeframe, to reference due dates.

There are several reasons why it is preferable to use a calendar date as the due date for a questionnaire, rather than a vague timeframe (*e.g.*, "within 30 days of receipt"). First, a survey might "float" around an organization before the appropriate respondent is identified and selected (Sudman *et al*., 2000). Specifying an actual date is useful in such circumstances, otherwise the date of receipt is left up to the interpretation of the respondent – is it when the questionnaire arrived at the establishment, or when the appropriate respondent received it? Secondly, having a specific due date assists in follow-up operations, because it makes it clearer when a response is overdue. Finally, Sudman *et al.* (2000) also states that a specific due date is more useful to companies for planning their work.

However, it may not always be possible to use a calendar due date and, in these instances, the use of a vague timeframe is necessary and acceptable. For example, the same questionnaire might be used for multiple mailout efforts, as is the case with the

Survey of Business Owners. Another example occurs when the mailout date varies due to competing priorities (*e.g.*, the mailout date is not certain, and may be moved based on other surveys' mailout dates), so that it is not certain that a respondent will receive the survey with enough time to respond by the due date. Finally, a questionnaire might not have a statistical reference period, and the questionnaire can be mailed at any time; classification forms are an example of this circumstance.

8. Guidelines on Matrices

Matrices are often employed in economic surveys, "usually as a way to save space by reducing the number of times a question is asked or to avoid repetitive questioning about similar items" (Hunter *et al*., 2005). Though efficient in terms of the amount of space needed on a page, matrices are burdensome in terms of the cognitive processing they require of respondents. Mainly, this is because respondents must keep multiple pieces of information – based on the row and column headers, as well as any accompanying information and instructions – in their minds at one time to provide their response. In his examination of the 1992 Manufacturing Energy Consumption Survey, Dillman (2000) referred to the difficulties in "having to comprehend several different lines of information simultaneously in order to know what the actual survey question is" (p. 343). Tourangeau *et al*. (2000) suggest that such an effort is taxing on the brain's working memory and, as a result, some pieces of information may be dropped.

There is evidence from the literature on household surveys to suggest that matrices lead to unit and item nonresponse. Dillman (2000) found that "changing from a matrix to individual-space format…improved response slightly and also reduced item nonresponse…the change to an individual-space format required an additional eight pages (from 20 to 28), but overall response improved from 3 to 4 percentage points" (p. 105). Like household surveys, individuals complete economic surveys, so it is reasonable to expect that these findings would apply to the economic survey setting. While accountants, who are likely familiar with matrices, tend to complete many economic surveys, it is still useful to limit their use for those instances in which the individual might not be as familiar with matrices as we would expect.

The matrix in Appendix C comes from the Bureau of Economic Analysis' former quarterly foreign direct investment questionnaire, in use before 2007. It is quite complex. To provide appropriate data, respondents must keep the following pieces of information in mind: a specific country, only certain entities within the respondent's corporate structure, beginning of- and end of-quarter balances for long-term liabilities, and other specific types of liabilities (*e.g.*, interest, royalties, film and television tape rentals).

The matrix makes it somewhat clear where respondents should enter their data (in the white answer spaces, though the column for "BEA Use Only" is also in white), but the cognitive burden associated with completing the matrix is still present. Eliminating the matrix by converting each data item into an individual question might reduce the

cognitive burden associated with completing it, though linkages among the items might be lost. The data requested in the matrix shown in Appendix C were similar to the data requested immediately before it, which asked about transactions with a different set of corporate entities. By keeping these two items visually consistent, linkages were maintained among the variables, although the question target differed. Thus, it made sense to retain the matrix.

8.1 Limit the use of matrices. Consider the potential respondent's level of familiarity with tables and matrices when deciding whether or not to use them.

Reading tables and matrices is a learned skill that is highly developed among accountants who typically work with spreadsheets. Matrices may be appropriate under certain circumstances, namely when the survey's respondents are likely to have learned the skill of working with tables, or when there is no other way to present the data request in a concise manner. In determining whether or not using a matrix is appropriate, it is best to consult with respondents, whether through qualitative or quantitative pretesting, or through examinations of record-keeping practices to learn as much as possible about their perspective. When a survey's respondents are not likely to be familiar with tables, it would be better to minimize the use of matrices, or at minimum provide more open space to make them look less intimidating.

The example shown in Appendix C spans across two sheets of legal-sized paper. This matrix is a critical component of the data collection effort for the survey. Interviews conducted with approximately 25 respondents indicated that most of them had a background in accounting, and were familiar with reading tables and spreadsheets. It was reasonable to retain a matrix format; however, it was redesigned to be less intimidating and more visually appealing (see Appendix D). Details follow in 9.2.

8.2 If a matrix is necessary, help respondents process information by reducing the number of data items collected and by establishing a clear navigational path.

A matrix may be useful when inter-relationships among data items must be preserved, and when respondents' familiarity with tables has been well established. If a matrix must be used, there are several ways to improve its flow, and make it easier for respondents to complete. We advise applying the guidelines described earlier in this document, especially with regard to breaking down complex questions into manageable questions (Section 3.2) and using blank space to separate questions and ease navigation (Section 6.4). Survey designers can also help ease the cognitive burden on respondents through improved visual layout, by taking advantage of the Gestalt principles of proximity (items that are close together appear related) and connectedness (items that are connected to each other appear related).

One way to make matrices easier for respondents is by reducing the number of data elements that are collected in the matrix. This could be done by condensing several

rows or columns, as was done as part of the redesign of the Annual Survey of Local Government Finances (F-28). As can be seen in Figure 50, Part VII of the 2003 version of the questionnaire asked respondents to split their long-term debt among systems for public schools, water supply, electric power, gas supply, and transit (rows 1-5), as well as privately owned housing or industrial or business purposes (row 6). The matrix had six columns and seven rows.

Figure 50. 2003 Annual Survey of Local Government Finances (F-28), long-term debt

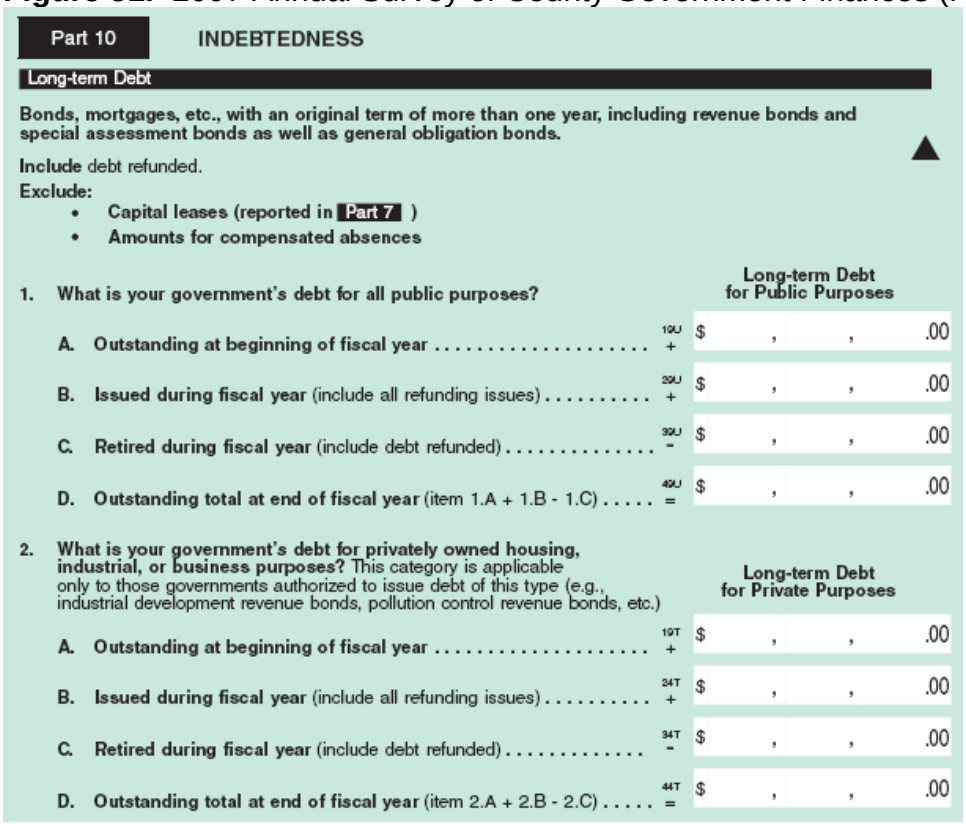
Part VII INDEBTEDNESS

A. Long-term debt — Bonds, mortgages, etc., with an original term of more than one year issued in the name of your government or of particular agencies. *Include in column (e) revenue and nonguaranteed special assessment bonds payable solely from pledged earnings or special assessments on property owners. Report in column (f) general obligations and any debt backed by pledged resources but guaranteed by your government if these sources are insufficient.* **Exclude lease purchase installment contracts and amounts for compensated absences.**

Debt	Amount — ***Omit cents***					
	Outstanding at beginning of fiscal year (a)	Issued during fiscal year *(Include all refunding issues)* (b)	Retired during fiscal year *(Include all refunded debt)* (c)	Outstanding total *(Column (a) plus (b) minus (c))* (d)	Detail of long-term debt outstanding: Revenue and nonguaranteed bonds (e)	Detail of long-term debt outstanding: Guaranteed bonds (f)
1. Public school	19H $ .00	29F $ .00	39F $ .00	$ .00	44F $ .00	41F $ .00
2. Water supply system	19A .00	29A .00	39A .00	.00	44A .00	41A .00
3. Electric power system	19B .00	29B .00	39B .00	.00	44B .00	41B .00
4. Gas supply system	19C .00	29C .00	39C .00	.00	44C .00	41C .00
5. Transit system	19D .00	29D .00	39D .00	.00	44D .00	41D .00
6. Public debt for privately owned housing or industrial or business purposes	19T .00	24T .00	34T .00	.00	44T .00	
7. All other purposes	19X .00	29X .00	39X .00	.00	44X .00	41X .00

When the survey was redesigned, the rows for the various systems (water supply, electric, gas, transit) were condensed into “long-term debt for public purposes.” The long-term debt for public purposes was then asked separately from the “long-term debt for private purposes,” which had been collected in row 6 in Figure 50. Also, rather than collect this collapsed information in a matrix, two separate questions – each with four sub-items – were asked. The end result of these changes was the elimination of the matrix, as seen in Figure 51.

Figure 51. 2007 Annual Survey of County Government Finances (F-28), long-term debt



Part 10 INDEBTEDNESS

Long-term Debt

Bonds, mortgages, etc., with an original term of more than one year, including revenue bonds and special assessment bonds as well as general obligation bonds.

Include debt refunded.

Exclude:

- **Capital leases (reported in Part 7)**
- **Amounts for compensated absences**

		Long-term Debt for Public Purposes
1. What is your government's debt for all public purposes?		
A. Outstanding at beginning of fiscal year	19U +	$, , .00
B. Issued during fiscal year (include all refunding issues)	29U +	$, , .00
C. Retired during fiscal year (include debt refunded)	39U −	$, , .00
D. Outstanding total at end of fiscal year (item 1.A + 1.B - 1.C)	49U =	$, , .00
2. What is your government's debt for privately owned housing, industrial, or business purposes? This category is applicable only to those governments authorized to issue debt of this type (e.g., industrial development revenue bonds, pollution control revenue bonds, etc.)		**Long-term Debt for Private Purposes**
A. Outstanding at beginning of fiscal year	19T +	$, , .00
B. Issued during fiscal year (include all refunding issues)	24T +	$, , .00
C. Retired during fiscal year (include debt refunded)	34T −	$, , .00
D. Outstanding total at end of fiscal year (item 2.A + 2.B - 2.C)	44T =	$, , .00

Another way of reducing the number of data elements to be collected is to avoid asking respondents to perform calculations on the data they are reporting, or to require them to copy data reported previously in the questionnaire. When the 2006 Manufacturing Energy Consumption Survey was fielded, a shorter version of the questionnaire was created that reduced the number of data items that were collected using both of these techniques. The decision to create a shorter questionnaire came as a result of an analysis of response rates for the 2002 survey that indicated different reporting patterns for smaller establishments compared with larger ones.

Once the data elements, rows, and columns of a matrix have been determined, it would be helpful to establish the expected navigational path through the matrix. Usually, this involves guiding respondents through the matrix either row-by-row or column-by-column. In some cases, testing with respondents will indicate that most respondents take a similar course. In other cases, testing with respondents will not provide an indication of a "typical" path. In this event, the survey designers should take the lead in setting up a navigational path, so as to minimize the possibility of measurement error arising from inconsistencies in the way respondents choose to complete the matrix. This can be done using dominant vertical or horizontal lines. If the matrix should be completed by rows, use a dominant horizontal line; if it should be completed by columns, use a dominant vertical line. (A note about key-from-image restrictions: The matrix shown in Appendix D was not designed for a key-from-image processing system. If it had been, some changes would have been necessary. For example, black borders

around each response space would have been required so that the system could detect the response areas to present for keying.)

The matrix shown in Appendix C, which came from the pre-2007 version of the Bureau of Economic Analysis' quarterly foreign direct investment questionnaire, gave no indication as to the expected path of completion. Lines were of equal shading, and spacing was uniform. The redesigned matrix (Appendix D) was designed using a light blue background with white answer spaces. A dominant horizontal line in a darker shade of blue was used to separate one row from another, indicating that respondents should complete the matrix row-by-row. The addition of the "000" in a column that shared shading with the background (indicating that responses should be reported in thousands of dollars, rather than dollars) at the end of each answer space served to add space between data elements from one column to another.

Cognitive testing and a pilot test on the redesigned matrix showed that it performed better than the old version (Tuttle *et al*., 2007). The improvement cannot be attributed solely to the usage of lines and spacing however. Additional factors included a clearer navigation path (made clear with the reverse-print bubble question numbers), more open space, and a reduction in the number of data elements that were collected.

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Appendix A: A Snapshot of the Questionnaire Design Guidelines

Guidelines on Wording

- Phrase data requests as questions or imperative statements, not sentence fragments or keywords.
- Break down complex questions into a series of simple tasks.

Guidelines on the Display of Answer Spaces / Response Options

- Use white spaces against a colored background to highlight answer spaces.
- Use similar answer spaces when requesting the same type of information.
- Clearly indicate the unit of measurement for each data item.
    - Avoid constantly switching from one unit to another and back again.
- Decide whether or not to provide previously reported data to respondents after weighing the potential data quality benefits and risks and the potential disclosure and security risks.
- Provide “Mark X if None” checkboxes only if it is necessary to differentiate between item non-response and reported values of zero.

Guidelines on Eliminating Visual Clutter

- Use font variations consistently and for a single purpose within a questionnaire.
    - Recommended font variations for paper surveys:
        - Print data item numbers in reverse-print bubbles.
        - Use sans serif fonts.
        - Print questions in bold text, minimum 8-point font, possibly larger than instructions and response options.
        - Print instructions in italics, minimum 8-point font.
        - Print response options in plain text, minimum 8-point font.
        - De-emphasize keycodes for respondents.
        - De-emphasize “Census Use Only” spaces.
    - Recommended font variations for electronic surveys:
        - Print data item numbers in reverse-print bubbles, if there is no loss of clarity. Otherwise, clearly indicate the order in which questions should be completed.
        - Use sans-serif fonts.
        - Print questions in bold text, possibly larger than instructions and response options.
        - Print instructions in plain text.
        - Print response options in plain text.
        - Avoid italics.
- Group data items and their answer spaces / response options.
- Evaluate the necessity of any graphics, images, and diagrams to ensure that they are useful for respondents.

Guidelines on Establishing a Clear Navigational Path

- Use a consistent page or screen layout.
    - For paper surveys, use a booklet format.
    - Arrange questions in a single column, rather than multiple columns.
- Clearly identify the start of each question and section.
    - Using a “Start Here” header may cause respondents not to pay attention to instructions prior to the first question.
    - Use reverse-print for section headings.
    - Ensure that questions are numbered consecutively from beginning to end.
    - Number questions consistently across modes.
- Group similar data items together.
    - Avoid using lines to separate items that are related.
- Use blank space to separate questions and make it easier to navigate within questionnaires.
- Align questions and answer spaces / response options.
    - Arrange response options in a single column below the question, rather than in multiple columns.
- Use strong visual features to emphasize skip instructions.
    - Examples include the use of an arrow, bolding skip instructions, and the addition of parenthetic information at the beginning of the following question (*e.g.*, “(If Yes…)”).
- Inform respondents of the navigational path when a question continues on another page.
    - Examples include adding a banner at the bottom of the page that says “Continue with [item number] on page [page number]” and a repeated section header at the top of the following page with the word “Continued.”

Guidelines on Instructions

- Incorporate question-specific instructions into the survey instrument where they are needed. Avoid placing instructions in a separate sheet/booklet/webpage.
    - If instructions appear with a question on the paper version, they should appear with the question (not with a help link) on the electronic version.
- Consider reformulating important instructions as questions.
- Convert narrative paragraphs to bulleted lists.
- When possible, use an actual date, rather than a vague timeframe, to reference due dates.

Guidelines on Matrices

- Limit the use of matrices. Consider the potential respondent’s level of familiarity with tables when deciding whether or not to use them.
    - To determine whether or not using a matrix is appropriate, interact heavily with respondents through qualitative or quantitative pretesting or studies of record-keeping practices.

- If a matrix is necessary, help respondents process information by reducing the number of data items collected and by establishing a clear navigational path.
    - Guidelines on breaking down complex questions into manageable tasks and using blank space to separate questions and ease navigation apply to matrices.
    - Reduce the number of data items in the matrix.
    - Explore the possibility of not asking respondents to perform calculations on the data they are reporting.
    - Establish a navigational path through the matrix (probably either row-by-row or column-by-column) using dominant horizontal or vertical lines.

Appendix B: Two facing pages, instructions on the left, questions on the right, from the Bureau of Economic Analysis' quarterly foreign direct investment questionnaire, pilot version

Instructions for Part IV — Change in Foreign Parent's Equity in the U.S. Affiliate During the Quarter

Entries in Part IV are necessary to identify the amount and cause of any changes in equity holdings by the foreign parent in the U.S. affiliate during the quarter.

- Report the transaction (i.e., market) value of consideration given or received for increases or decreases in the foreign parent's equity holdings in the U.S. affiliate.

17 A. Include:

- purchases of capital stock by the foreign parent from the U.S. affiliate;
- contributions of equity by the foreign parent that did not result from the issuance of stock to the foreign parent by the U.S. affiliate;
- capitalization of intercompany debt (report the amount of debt converted to equity as the transaction value of the equity increase in item 17 A), and adjust the debt balance as appropriate in Part V item 21;
- unincorporated U.S. affiliates must report the foreign parent's share of any increase in the U.S. affiliate's equity (or home office account) arising from its transactions with the foreign parent, excluding amounts reported in Part III and Part V.

Exclude changes caused by:

- carrying net income to the equity account;
- the effect of treasury stock transactions with persons other than the foreign parent;
- reorganizations in capital structure that do not affect total equity.

17 B. Include:

- sales of capital stock by the foreign parent to the U.S. affiliate;
- returns of contributed equity capital to the foreign parent not resulting in a reduction of issued stock;
- distributions to the foreign parent following total liquidation of the U.S. affiliate;
- unincorporated U.S. affiliates must report the foreign parent's share of any decrease in the U.S. affiliate's equity (or home office account) arising from its transactions with the foreign parent, excluding amounts reported in Part III and Part V.

Exclude changes caused by:

- carrying net losses to the equity account;
- payment of stock or cash dividends (other than liquidating dividends);
- the distribution of earnings during the period;
- the effect of treasury stock transactions with entities other than the foreign parent;
- reorganizations in capital structure that do not affect total equity.

Part IV – Change in Foreign Parent's Equity in the U.S. Affiliate During the Quarter

For Transactions between the Foreign Parent and U.S. Affiliate

17 What is the transaction value of the foreign parent's: (Bil. Mil. Thou. Dols.)

A. Increase of equity in the U.S. affiliate? 026 $ 000

B. Decrease of equity in the U.S. affiliate? 027 $ 000

For Transactions between the Foreign Parent and an Entity other than U.S. Affiliate

18 What is the transaction value of the ACQUISITION of an equity interest in the U.S. affiliate by the foreign parent:

A. From a U.S. entity other than the U.S. affiliate? 028 $ 000

B. From all foreign entities? 029 $ 000

19 What is the transaction value of the SALE of an equity interest in the U.S. affiliate by the foreign parent:

A. To U.S. entities other than the U.S. affiliate? 030 $ 000

B. To all foreign entities? 031 $ 000

20 What is the total transaction value of the change in the foreign parent's equity interest in the U.S. affiliate? 032 $ 000

This item should equal the sum of items 17 A, 18 A, and 18 B MINUS the sum of items 17 B, 19 A, and 19 B.

21 For items 18 and 19, what are the amounts by which the transactions values reported in those items:

	For acquisition (18 A & B) Bil. Mil. Thou. Dols.	For sale or termination of operations (19 A & B) Bil. Mil. Thou. Dols.
A. Exceed the value carried on the books of the U.S. affiliate?	903 2 $ 000	903 4 $ 000
B. Are less than the value carried on the books of the U.S. affiliate?	903 3 $ 000	903 5 $ 000

Appendix C: Matrix from Bureau of Economic Analysis' old quarterly foreign direct investment questionnaire.

Part VI DIRECT TRANSACTIONS OR ACCOUNTS BETWEEN U.S. AFFILIATE AND FOREIGN AFFILIATES OF THE FOREIGN PARENT (FAFP)

33. Does the U.S. affiliate (as consolidated) identified on page 1, item 2 of this form have direct transactions or accounts with foreign affiliates of the foreign parent identified on page 1, item 47 – *Mark (X) one.*

042 1 1 ☐ Yes – *Complete this page. Do not duplicate amounts already reported on page 1, items 18 through 24.*

1 2 ☐ No

Report all direct transactions between the U.S. affiliate and FAFP (FAFP means, with reference to the reporting U.S. affiliate in item 2, (i) any foreign person proceeding up the foreign parent's ownership chain – **excluding** the foreign parent – which owns more than 50% of the entity below it up to and including that entity which is not owned more than 50% by another foreign person and (ii) any foreign entity proceeding down the ownership chain(s) of each of the entities listed above in (i), which is owned more than 50% by the entity above it). Do not include any direct transactions, accounts, or balances between the U.S. affiliate and the foreign parent – they must be reported in Parts III and IV. Do not net payables against receivables. In Section A, report payments and liabilities due to, and, in Section B, report receipts and receivables due from, FAFP by country. Enter only one foreign country per line. If more lines than provided are needed in order to list all countries, use additional copied sheets as necessary, properly identified with the name of the U.S. affiliate. A country should be reported separately if one item is $500 thousand or more for that country. Countries for which all amounts are less than $500 thousand may be combined on line 45, "Unallocated by country," for U.S. affiliates payments and liabilities and on line 58, "Unallocated by country," for U.S. affiliate's receipt and receivables. Please note: Amounts in column 8 should not include goods.

Report all amounts in thousands of U.S. dollars, as illustrated.

EXAMPLE: If amount is **$1,125,628,000.00** – *Report as shown* . . . . . .

Bil.	Mil.	Thous.
1	125	628

Country of foreign affiliate of foreign parent – *Enter amounts of $500 thousand or greater for all individual countries*	BEA USE ONLY (1)	Current and long-term liabilities or receivables: End-of-quarter balance (2)	Current and long-term liabilities or receivables: Beginning-of-quarter balance (3)	Interest – *Including interest on capital leases* (4)	Royalties, license fees, and other fees for the use or sale of intangible property (5)	Charges for the use of tangible property (6)	Film and television tape rentals (7)
Section A – U.S. AFFILIATE'S LIABILITIES AND PAYMENTS TO FAFP		Liabilities of U.S. affiliate TO FAFP		Payments or accruals, whichever occurred first, to FAFP (after deduction of U.S. tax withheld)			
		Bil. Mil. Thous.	Bil. Mil. Thous.	Bil. Mil. Thous.	Bil. Mil. Thous.	Bil. Mil. Thous.	Bil. Mil. Thous.
34. Canada 044	1 100	2	3	4	5	6	7
35. United Kingdom 045	1 327	2	3	4	5	6	7
36. Netherlands 046	1 319	2	3	4	5	6	7
37. Japan 047	1 614	2	3	4	5	6	7
Other countries – *Specify*							
38. 048	1	2	3	4	5	6	7
39. 049	1	2	3	4	5	6	7
40. 050	1	2	3	4	5	6	7
41. 051	1	2	3	4	5	6	7
42. 052	1	2	3	4	5	6	7
43. 053	1	2	3	4	5	6	7
44. 054	1	2	3	4	5	6	7
45. Unallocated by country – *Sum of amounts for each country for which each entry is less than $500 thousand* 155	1 709	2	3	4	5	6	7
46. TOTAL – *Sum of items 34 through 45* 156	1	2	3	4	5	6	7

Appendix D: Redesigned matrix on Bureau of Economic Analysis' quarterly foreign direct investment questionnaire.

Part VI – Balances and Interest Between U.S. Affiliate, as Consolidated, and Foreign Affiliates of the Foreign Parent (FAFPs)

24 Does the consolidated U.S. affiliate have accounts or direct transactions with foreign affiliates of the foreign parent (FAFPs)?

043 1 ☐ Yes – Continue with 25 through 28. (Note: Instructions for Part VI appear on page 8.)
2 ☐ No – Skip to Part VII

Note: For Part VI, values for countries which individually amount to less than $500 thousand may be combined in the "Unallocated" row. Do NOT net payables against receivables.

U.S. Affiliates' Payables and Interest Payments to FAFPs

25 Payable balances

What were the balances with the FAFPs at the end and beginning of the quarter, by country?

26 Interest paid

What amounts, including interest on capital leases, were credited directly to FAFPs during this quarter, by country?

Country of FAFP		BEGINNING of quarter Bil.	Mil.	Thou.	Dols.	END of quarter Bil.	Mil.	Thou.	Dols.	Interest paid Bil.	Mil.	Thou.	Dols.
A. Canada	044 1 100	$			000	$			000	$			000
B. United Kingdom	045 1 327	$			000	$			000	$			000
C. Netherlands	046 1 319	$			000	$			000	$			000
D. Japan	047 1 614	$			000	$			000	$			000
Other countries – *Specify*													
E.	048 1	$			000	$			000	$			000
F.	049 1	$			000	$			000	$			000
G.	050 1	$			000	$			000	$			000
H.	051 1	$			000	$			000	$			000
I.	052 1	$			000	$			000	$			000
J.	053 1	$			000	$			000	$			000
K.	054 1	$			000	$			000	$			000
L.	055 1	$			000	$			000	$			000
M.	056 1	$			000	$			000	$			000
N.	057 1	$			000	$			000	$			000
O.	058 1	$			000	$			000	$			000
P. Unallocated – Values for countries that individually amount to less than $500 thousand.	155 1 709	$			000	$			000	$			000
R. TOTALS	156	$			000	$			000	$			000

If more rows are needed in order to list all countries, use additional sheets as necessary. A photocopy of Page 10 and/or Page 11 may be used for this purpose.

U.S. Affiliates' Receivables and Interest Receipts from FAFPs

27 Receivable balances

What were the balances with the FAFPs at the end and beginning of the quarter, by country?

28 Interest received

What amounts, including interest on capital leases, were credited directly from FAFPs during this quarter, by country?

Country of FAFP		BEGINNING of quarter Bil.	Mil.	Thou.	Dols.	END of quarter Bil.	Mil.	Thou.	Dols.	Interest received Bil.	Mil.	Thou.	Dols.
A. Canada	044 1 100	$			000	$			000	$			000
B. United Kingdom	045 1 327	$			000	$			000	$			000
C. Netherlands	046 1 319	$			000	$			000	$			000
D. Japan	047 1 614	$			000	$			000	$			000
Other countries – *Specify*													
E.	048 1	$			000	$			000	$			000
F.	049 1	$			000	$			000	$			000
G.	050 1	$			000	$			000	$			000
H.	051 1	$			000	$			000	$			000
I.	052 1	$			000	$			000	$			000
J.	053 1	$			000	$			000	$			000
K.	054 1	$			000	$			000	$			000
L.	055 1	$			000	$			000	$			000
M.	056 1	$			000	$			000	$			000
N.	057 1	$			000	$			000	$			000
O.	058 1	$			000	$			000	$			000
P. Unallocated – Values for countries that individually amount to less than $500 thousand.	155 1 709	$			000	$			000	$			000
R. TOTALS	156	$			000	$			000	$			000