

Establishments as Respondents: Is Conventional Cognitive Interviewing Enough?  
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The Energy Information Administration (EIA) does not rely solely on cognitive interviewing to develop and test survey instruments for its establishment surveys. This paper discusses EIA's recent efforts at implementing a methodology that goes beyond conventional cognitive interviewing to develop and revise our surveys. Specifically, the paper will focus on three aspects of that methodology:

- Pre-survey design visits
- Data models
- Expanded cognitive interviews

Conventional cognitive interviewing is very useful for determining if respondents understand the questions in a survey. With business surveys, though, there are critical dimensions in addition to question comprehension and other cognitive aspects of survey response. Specifically, there are four dimensions that differentiate EIA's establishment surveys from household surveys.

- In establishment surveys the respondent is an intermediary between the data collector and the information that the collector needs. The respondent is an agent of the company, providing information not about themselves, but about the company for which they work.
- Respondents in establishment surveys generally rely on business records for providing information rather than on personal recall about behavior or attitudes. Measurements are made at various points in the business process, and are subject to error, as well as a lack of correspondence between the agency's desired data and a company's record keeping practices.
- Data from establishment surveys are often a compilation of information from several departments or entities within the establishment. These entities may have different recording keeping practices, which make the data submission internally inconsistent.
- Business practices, especially in industries that are undergoing significant change, are so dynamic that surveys are difficult to design or redesign without a clear understanding of how these changes might impact on the data collection.

### **Pre-Survey Design Visits**

#### *Objectives*

Pre-survey design visits are meetings with respondents or potential respondents conducted at their place of business. They are conducted once an initial cut of the data

requirements is made, but before a questionnaire is actually developed or revised<sup>1</sup>. Substantively, EIA's pre-survey design visits focus on four areas.

1. Data availability: EIA asks the respondent if they have the data for which the agency is asking and how difficult would it be for them to get those data.
2. Record keeping practices: EIA discusses with the respondent issues of industry terminology, units of measure, measurement points (where in their business processes do they measure the data) will they provide estimates vs. actual counts, data classifications, and calendar month versus billing cycle. (EIA ask respondents for data by calendar month and respondents, particularly electric and natural gas utilities keep their books by billing month, the 24<sup>th</sup> to the 23<sup>rd</sup> of a month, the 25<sup>th</sup> to the 24<sup>th</sup> of a month, and so on.)
3. Timing: EIA asks the respondent when can they submit their most current data to the agency. How long will it take them after the end of the reporting period to supply the data to EIA.
4. Data sensitivity: EIA asks the respondent to what extent is the information requested business sensitive and needs to be treated as confidential.

## Methodology

The basic requirements for an EIA pre-survey design visit to be successful are:

- The data requirements that are clearly understood and articulated by the survey sponsors and clearly communicated to the potential respondents.
- There is a protocol that covers all the issues and keeps the discussion on track.
- Interviews are not highly structured to encourage respondents to explain their record keeping and business operations. While it is important to have a protocol or script to follow, the respondents need to be able to expand upon their answers, and deviate somewhat from the topic in order to get a fuller understanding of their ability to provide needed data. They also may have questions about EIA's data needs.
- The survey sponsors accompany survey methodologists on the visits. They hear and see first hand from the potential respondents what the respondent's concerns are. This way methodologists have much less trouble convincing the sponsor of the visits' findings and recommendations once we get "back to the office." This saves a lot of time in the agency's survey development and testing process.

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<sup>1</sup> Determining data requirements is the first step in EIA's total methodological approach. This step is simply determining the data that the agency wants to collect in the new or redesigned questionnaire.

### *Electricity Visits*

EIA has developed its pre-survey design procedures through experience and expert guidance.

EIA's first pre-survey design visits were in the electricity industry. The purpose of these visits was to develop background information on the deregulation of the electricity industry. EIA visited California and Northeast first, because the two areas were in the forefront of wholesale and retail electricity deregulation. The interviews provided useful information on the latest industry developments and trends in these geographic areas. They also provided useful information on data sensitivity. They provided little information on questions of data availability, record keeping, and timing.

### *Natural Gas Visits*

The natural gas visits focused more on issues of data availability, record keeping, and timing, and less on developing background information. The visits also had the benefit of advice from the American Statistical Association Advisory Committee on Energy Statistics. At the Spring, 1999 meeting of the Committee, the late Seymour Sudman and other Committee members<sup>2</sup> recommended for pre-survey design visits that EIA:

- Spend time “recruiting” the right person (or persons), those who fill out the surveys and know their company's data.
- Sell to the establishment that part of the purpose of the visit is to reduce respondent burden. “This is big with them.”
- Concentrate on the larger companies. They may be more expensive to visit, but they are the bulk of the coverage.
- Use a stratified approach for smaller companies.
- Find out about the organizational structure of the establishment. This is how they may organize their records. All the data do not reside in one office. This relates back to the first bullet. There may be more than one right person to talk to. When setting up appointments ask the establishment to have all the departments who do (or will) fill out EIA forms attend the meeting.

EIA applied this advice and the lessons that we learned from the electricity visits to the visits to natural gas utilities and marketers. We spent a lot of time and effort drafting and redrafting a protocol focusing on data availability, record keeping practices, and data timing and data sensitivity.

EIA also concentrated on making appointments with large companies and on making sure that we made the appointment with the “right person.” We used a carefully crafted phone script that emphasized to the respondent that a major purpose of the visit was to collect information for forms design (or redesign) that could lead to reduced burden for them.

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<sup>2</sup> F. Jay Breidt, Polly Phipps, and Roy Whitmore. The quotes in the bullets are from Sudman.

Finally, cognizant that we may need to talk to more than one person, we asked our contacts at the establishments to bring to the interview, if necessary, any additional staff.

The preparation paid dividends. EIA collected a lot of useful information during the visits on the types of data the establishment had and how they organized them from which to move to the instrument design phase and then to the testing step.

### **Data Models**

A data model can be constructed before pre-survey design visits, and tested during the visits, or constructed after pre-survey design visits from the information collected during the visits. It is a tool to organize and analyze information, to bring clarity to complexity.

The characteristics of a data model are:

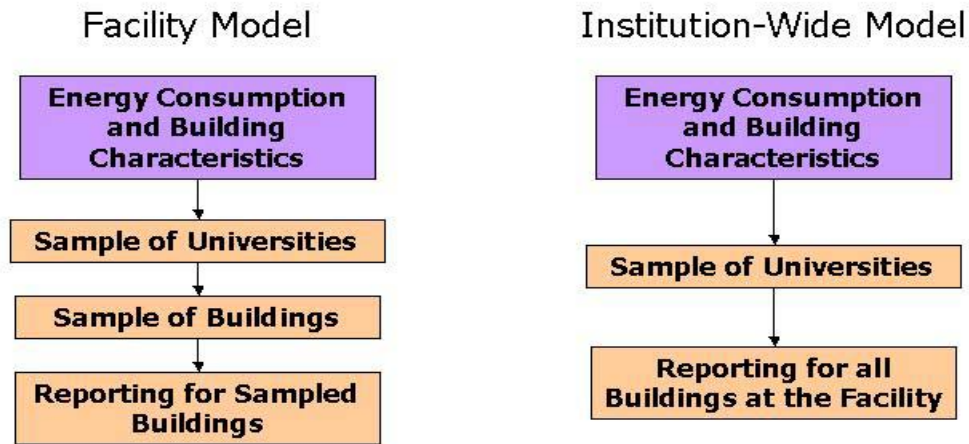
- Outline of different data collection options for the proposed survey
- From whom will the data be collected in each option
- The data that will be collected in each option
- The advantages and disadvantages of each option
- Frames and other issues for each option.

#### *EIA's Commercial Buildings Energy Consumption Survey's Data Model*

An example of how a combination of pre-survey design visits and data models can be used to assess the feasibility of changing an existing data collection methodology is EIA's Commercial Buildings Energy Consumption Survey (CBECS). The data models are outlined in Figure 1.

The CBECS collects building characteristics and energy consumption data on institutions – e.g., college campuses, hospitals, prisons, shopping centers, and the like. EIA has been collecting data from these institutions through the facility model, the left-hand column of Figure 1. Using colleges and universities as the example, EIA would select a nation-wide sample of colleges and universities. Then, within each campus, it would select five or six buildings and then conduct a separate building characteristics and energy consumption data interview for each building. This would add up to five or six hours of interviews for each campus, often with the same person representing the institution in each interview. EIA would then calculate national and census region building characteristics and energy consumption estimates from data collected from the sampled buildings.

Figure 1. Commercial Building Energy Consumption Survey – Facility Model vs. Institution-Wide Model



EIA wanted a collection methodology for the CBECS that would:

- Provide more accurate data
- Reduce respondent burden
- Reduce survey costs

In early 2002, EIA studied the feasibility of changing the collection methodology for the CBECS to the institution-wide model, the right hand column, to reach these goals. The interviews now would be only one to one hour and a half hours.

EIA conducted pre-survey design visits to 17 college campuses to assess the feasibility of institution-wide model. The collection model worked well for energy consumption, but not for building characteristics. For example, EIA's proposed data classifications, of campus building use for example– e.g., athletic, classroom, computer, administrative, food services -- did not correspond at all to the campus' bookkeeping systems. Because of this, EIA decided not to collect institution-wide data and to continue to use the facility model.

The major point is that pre-survey design visits provided important decision making information. On the basis of the interviews, EIA did not change the data collection methods.

## Expanded Cognitive Interviews

Once EIA has conducted pre-survey design visits and constructed data models; decided upon a collection methodology, the agency designs a form and then cognitively tests it. EIA conducts these interviews at the respondent's place of business. If we are testing a brand new survey, we identify ourselves and ask to speak to the person in the company who is responsible for completing surveys or the person who is responsible for producing company reports on the items of interest to EIA. For existing surveys that are undergoing major revision, we contact the current survey respondent. In both instances, we ask our contact to bring to the interview any business records they would use in completing the survey and anyone in the company who might be involved in completing the survey.

There are three aspects to an EIA's expanded cognitive interview (and, with the respondent's permission, we tape the entire interview). The first is a formal "think aloud" interview with a structured protocol with probes and follow-ups. The object is to test cognitive aspects of the question wording, the instructions and the concepts to be measured. The respondents are asked to go through the questionnaire and describe how they would complete the survey form. The respondents often have questions such as "What does EIA mean here" or "What is it that you want us to report in this section." We respond with the standard, "What do you think EIA is asking for?" At the start of the interview we promise to answer any of these questions during the respondent debriefing once the "formal" part of the interview is completed.

The second aspect is the discussion of the establishment's business records. We discuss if there is a good fit between business records and survey concepts, operational definitions of terms, timing, i.e., billing cycle versus calendar month, meeting submission deadlines, and units of measures.

The third part is an informal question and answer period with the respondents had about the survey form. We discuss the purpose of the survey and the data model upon which it is constructed. We also take the opportunity to learn more about their business processes and record keeping practices. The discussion can yield as much information about how they would complete the survey as the formal cognitive interview.

### *Lessons Learned and Findings*

Perhaps, the most consistent finding across all EIA's interviews is that respondents rely very heavily on their previous submissions when completing a current survey. This is a particular problem when trying to redesign surveys to meet an evolving industry structure and changing data requirements. The quote, "I take great store in what I did the last time" from one of our early interviews on an annual natural gas survey, illustrates this point most clearly.

When testing a significantly streamlined version of an old survey, we ran into a similar problem. Some data categories were collapsed and others eliminated completely. The instructions were simplified from nine pages to four pages. Yet, in one section of the

form, respondents struggled for some time in trying to fit everything from the current survey into the proposed new one, even though they were no longer required to submit the old data. As one respondent put it, “I can’t seem to find a bucket for all my data!”

In another interview on the same revised survey, the participants were several individuals who had worked on the survey in the past and their manager. The individuals who had compiled the form in previous years used the “What we did last year” approach for completing the form and misinterpreted several of the key questions. The manager, who had not ever completed the form, but was familiar with his company’s data, understood the revised form, and would have completed it correctly. Several respondents, when asked what EIA could do to make the transition versions of the form easier, suggested developing a crosswalk between the existing form and proposed new form. While initially appealing, such a crosswalk could tend to perpetuate existing reporting errors.

We have also observed in other interviews with more than one staff person representing the establishment that there is often disagreement among them on what data EIA wants for a certain question. Again, those who do not complete the current form have a clearer (and more correct) concept of what EIA wants than those who do complete the current survey. It appears those who have completed the survey, these intermediaries between the agency and their companies data, use the “what we did last year approach” to completing the proposed redesigned survey. They bring a cognitive filter to the interview that confuses or misleads them about EIA wants next year on the survey.

A second important finding is that data for establishment surveys are often a compilation of information from several departments or entities within the establishment. The person who completes a survey for an establishment often may not know much about the data beyond what is printed on the department’s spreadsheet they use to complete a survey. They cannot answer the questions about how the data are derived and compiled within the company. This occurs often, especially in mid to large size companies.

Also, data from different departments with different functions often must be combined to produce the data that EIA is requesting. This has proved troublesome for some of our respondents especially if questions or their accompanying instructions are open to interpretation. The accounts receivable department might provide financial data based on contracts, while the operations department might provide information on physical flows. When these data need to be combined, the reconciliation process can be difficult and time consuming for the respondent.

## **Summary**

This paper discussed EIA’s recent efforts at implementing a methodology that goes beyond conventional cognitive interviewing to develop and revise our surveys to maintain accurate and timely data. With business surveys, the paper outlined, there are critical dimensions to in addition to question comprehension and other cognitive aspects of survey response. The paper focused on three aspects of that methodology or program:

pre-survey design visits, data models, cognitive interviews, and usability testing. Specifically:

- **Pre-survey Design Visits** – They are important in any survey design work, particularly for surveys of changing industries. They provide a “lay of the data land,” what data did respondents actually have and does the data correspond to what is needed. They provide the information from which to make data collection instrument design decisions.
- **Data Collection Models** – These are useful tools for summarizing data collected from pre-survey design visits for decision makers and survey designers.
- **Cognitive Testing** – They are invaluable for testing whether respondents will be able to complete proposed instruments and in fixing questions, errors in design, instructions, and terminology in revised surveys.

Even more important than the value of each survey methods on its own, was the use of an integrated approach to design and testing. Combining pre-survey design visits, formulating data models, and EIA cognitive testing procedures made each of the methods more effective than if they had been applied separately, and helps provide EIA with accurate and reliable data.