

Survey Documentation: On the Path to Enlightenment

Shawna Waugh
Energy Information Administration
1000 Independence Ave., Washington, DC
shawna.waugh@eia.doe.gov

Executive Summary: Survey documentation supports the Energy Information Administration's mission to provide high-quality energy information and ensures compliance with federal regulations. Furthermore, it ensures the survey process is transparent and reproducible and that survey results are presented in an objective manner. Available knowledge management tools are useful when developing documentation. Documentation provides information on performance and transfers knowledge regarding the quality of survey results and process to EIA customers, survey staff and contractors, and survey respondents. The transfer of knowledge concerning the survey is crucial when managing change – changes in data requirements, survey methods, survey processing systems, or transition in staff. A content management system provides a systematic and comprehensive approach to documentation and offers an optimal investment strategy. And, an optimal investment strategy would seek to minimize costs and maximize benefits while recognizing the diminishing returns on investment in documentation. A prototype content management system is being designed to create and produce documentation quickly and cost-effectively.

Key Words: Survey Documentation, Survey Quality, Standards, and Knowledge Transfer

Introduction: The purpose of this paper is twofold: first, to design a prototype system for producing survey documentation and second, to identify useful knowledge management tools to develop survey documentation.

In order to meet EIA's mission, EIA faces numerous challenges including changes in the energy industry and corresponding changes in data requirements, introduction of new survey methods and data processing systems, and turnover among staff, contractors, and respondents. Knowledge management tools are useful in educating both internal and external audiences on business processes and quality of survey results.

Survey documentation also ensures compliance with federal regulations, standards and guidelines, including *OMB's Information Quality Guidelines*. Survey documentation ensures the survey process is transparent and reproducible, and the survey results are presented in an objective manner.

A comprehensive and systematic approach to survey documentation utilizing knowledge management tools will minimize the costs and maximize the benefits of documentation. In addition, this approach will promote a shared vision of the survey process and results and will foster collaboration and communication between and amongst customers, survey staff and contractors, and survey respondents.

This paper will focus on the following four questions:

1. What is a comprehensive approach to survey documentation?

2. Why is survey documentation important?
3. What are useful tools from knowledge management for survey documentation?
4. What is an optimal investment strategy for survey documentation?

What is a comprehensive approach to survey documentation? A comprehensive survey documentation program seeks to establish a shared vision of survey process and desired results and a systematic approach to quality management. Table 1 (next page) identifies documentation for both internal and external audiences.

EIA publishes survey results and information on the survey process for customers. For example, data publications contain technical notes which describe the form, the frame, the sample, and the survey methods and procedures. Manuals (e.g., survey operation's manual, user's manual and programmer's manual) and other documentation are developed by and for EIA survey staff and contractors. Survey questionnaires, instructions, Frequently-Asked-Questions (FAQs), and other materials are also developed for survey respondents.

A comprehensive approach fosters collaboration, communication, and trust. Trust is achieved by establishing a common understanding of the survey process and results. Understanding is built through knowledge transfer via documentation (publications, manuals, and questionnaires). These sources serve to educate internal and external audiences about the survey process and quality of results.

Table 1: Survey Documentation by Users		
Users		
EIA Customers	Survey Staff and Contractors	Survey Respondents
Policy-makers Financial Analysts Energy Analysts Media Public	Managers Statisticians Industry Analysts Economists Contractors	Manufacturers Petroleum Refineries Pipeline operators Well operators Other respondents
Examples of Documentation		
Data Publication Data Series OMB Clearance Package and Federal Register Notice	Implementation Plan Operation's Manual User's and Programmer's Reference Manuals	Forms Instructions Frequently-Asked-Questions (FAQs)

Why is survey documentation important? Survey documentation ensures transfer of knowledge and compliance with federal regulations, standards, and guidelines. Knowledge transfer to internal and external audiences about the survey process and results is the primary benefit. The transfer of knowledge, especially when managing change, is essential in order to achieve EIA's mission and strategic goals.

The mission of the Energy Information Administration is "to provide high quality, policy-independent energy information to meet the requirements of Government, industry, and the public in a manner that promotes sound policymaking, efficient markets, and public understanding."¹

The major benefit of survey documentation is transfer of knowledge concerning new or revised survey programs to internal and external audiences. Survey documentation is critical due to transition in respondents, survey staff and contractors.

For example, of the 370 employees currently employed at EIA, nearly seventy-five (75) percent of the managers and nearly forty (40) percent of the staff will be eligible for retirement by the end of 2005. Transferring knowledge to new employees is one of EIA's Strategy Goals. Employees responsible for implementing changes in survey procedures and systems need orientation on the

new systems. Survey documentation provides an orientation tool for new employees on the survey operations and systems.

EIA continues to redesign survey programs as a result of the restructuring of energy industries, especially the natural gas and the electricity industries. Redesign of survey programs involves redesigning existing questionnaires and occasionally developing new ones, introducing new procedures and/or methods for data collection, processing and dissemination, and educating users on changes in the survey programs. EIA revises survey programs in order to collect more relevant data and to continuously improve the reliability of the survey data.

In addition, the reliability of data depends on educating the survey respondents about the purpose of the surveys and the concepts being measured. Educating respondents is critical to ensure relevant and reliable data is collected. The survey respondent at the facility or company who completes the form is a liaison between EIA staff and the respondent's colleagues who operate accounting systems and manage operations. To facilitate communication between survey respondents and EIA staff, the instructions and form contain data definitions.

Survey documentation is beneficial since it ensures compliance with federal regulations, including the Office of Management and Budget's Information Quality Guidelines and Vital Records. These guidelines are intended to provide "policy and procedural guidelines for Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by federal agencies."²

EIA's Information Quality Guidelines seeks to ensure the survey process is transparent and reproducible and that the survey results are objective and presented in an objective manner. Objectivity, reproducibility and transparency are defined as follows in *EIA's Information Quality Guidelines*³:

- *Objectivity* means ensuring "the substance of the information is accurate, reliable, and unbiased, and the information is presented in an accurate, clear, complete, and unbiased manner."
- *Reproducibility* means "capability of being substantially reproduced, subject to an acceptable degree of imprecision." With respect to analytical results, *capable of being substantially reproduced* means that "independent analysis of the original or supporting data using identical methods would generate similar analytic results, subject to an acceptable degree of imprecision or error."

- *Transparency* means “clear and concise information on such topics as information sources, survey and analytical methods, and accuracy and reliability.”

Another federal regulation involves retention of vital records, including documentation on survey process, sample, frame, quality control and data publication. Table 2 contains description of vital records for survey documentation which are established in [EIA Records Management 2000 Policy and Procedures Manual](#).

In 2002 EIA revised the [EIA Standards Manual](#) and many of these standards related to survey documentation, including:

- 2002-3 Information System Documentation
- 2002-4 Survey Collection/Processing Planning, Design, and Testing
- 2002-17 Information Utility
- 2002-18 Information Integrity
- 2002-23 Reproducibility
- 2002-24 Documentation for Public-Use Electronic Products
- 2002-30 Business Process Documentation
- 2002-32 EIA Record Management

Additional guidelines on survey documentation are provided by Federal Committee on Statistical Methodology (FCSM) and the United Nation’s Statistical Division in the *Handbook of Statistical Organizations: The Operation and Organization of a Statistical Agency*. In addition, FCSM produces the Statistical Policy Working Paper series. (A complete list of these reports is available on the [FCSM Web site](#).)

Statistical Policy Working Paper #31, “Measuring and Reporting Sources of Error in Surveys,” answered several questions, including “What information on sources of error should federal data collection programs provide and how should they provide it?” The subcommittee which prepared the report recommended that studies reporting analyses of statistical data should present the following three types of information⁴:

- Background description of the data collection programs used in the analysis;
- Description of each major source of error, the magnitude of the error source (if available), and any known limitations of the data; and
- Access to the questionnaire or questionnaire items used in the analysis, through the report or through electronic means, or upon request.

Survey Processing Records	Records created in the process of verification of respondent data. Included are respondent contact records detailing who was spoken with, topic of contact, outcome of the contact, and the reasons for the outcome. Other records of significant corrections created to ensure the accuracy and completeness of survey information are also included.
Survey Sample Documentation	Documentation on the development of survey samples, including correspondence, lists, analyses, and studies.
Survey Frame Backups on Electronic Media	Frame: the explicit display of the population from which the sample is to be chosen. Frame backups are created prior to frame updates to protect data from unexpected loss. Major updates are created when systematic searches result in the addition of new information sources and the deactivation of out-of-scope respondents which result in changes to a substantial number of records. Backups must be formatted according to standards in the EIA Standards Manual.
Quality Control Records	Records developed to check or test the accuracy, completeness, and reliability of data gathered in surveys and of information prepared for publication.
Documentation for Published Numbers	Documentation on the source of data published by EIA used to answer queries.
<i>Source: EIA Records Management 2000 Policy and Procedures Manual</i>	

What are useful knowledge management tools for survey documentation? Four knowledge management tools are useful in designing and developing survey documentation; these tools are described in Table 3 (next page).

The knowledge management tools are intended to educate and empower internal and external users about both the survey process and quality of survey data. Continually updating survey documentation to correspond with changes in survey questionnaires and procedures is critical.

Knowledge management tools are useful when documenting establishment surveys. EIA conducts more than 60 establishment surveys. These surveys, listed in the [EIA Forms Directory](#), collect data on the price and quantity of energy reserves, production, and consumption for energy sources.

Tools	Description
Data definitions	Definitions of terms used in surveys and included in the Glossary (or dictionary).
Critical thinking	Critical thinking involves planning and organizing relevant facts and information to meet the needs of the audience.
“Plain” English	Principles and procedures for preparing user-friendly documentation intended to engage the audience, to write clearly and concisely, and to use a visually appealing style.
Concept Mapping	Concept maps communicate ideas and procedures in a visual manner and support meaningful learning by introducing and linking new facts and ideas with prior knowledge.

A typical “supplier survey” collects data on products produced by an establishment (i.e. coke plant or petroleum refinery) and supplied to the following end use sector – residential, commercial, industrial, and electric utility. Table 4 contains information on the number of respondents for three of EIA’s surveys and demonstrates that the number of respondents on the frame can vary considerably from one survey to another.

In designing and developing survey programs, collaboration among program staff is needed to ensure consistency and comparability among the survey programs administered by EIA.

Data definitions exist for terms used in EIA surveys and these terms are included in the EIA glossary published for customers on EIA’s website. Establishing and maintaining the glossary addresses two common language problems – (1) a term conveying more than one meaning and (2) a concept being defined by more than one term.

Technical terms used by industry specialists have specific meaning in the context in which these terms are used. For example, the term “Christmas tree” typically refers to the tree displayed over the Christmas holidays, whereas in the

oil and gas industry this term refers to “the valves and fittings installed at the top of a gas or oil well to control and direct the flow of well fluids.”⁵

Form	Title of Survey	Frame
EIA-176	Annual Report of Natural and Supplemental Gas Supply and Disposition	1,300
EIA-920	Combined Heat and Power Plants Report	742
EIA-846	Manufacturing Energy Consumption Survey	~15,000

Source: [EIA Forms Directory](#)

When designing or reviewing forms for survey programs, it is important to ensure consistency in the use of data definitions. This will result in comparability of data across surveys.

Critical thinking is another knowledge management tool, involves planning and organizing relevant facts and information in documents to meet the needs of both audiences.

Table 5 (next page) contains questions associated with principles of critical thinking; these principles include verifiability, timeliness, relevancy, bias (fairness), orderliness, clarity, and validity.

Critical thinking is useful when designing and developing documents (including web publications, manuals, survey forms and instructions). Critical thinking is an approach intended to produce well-organized documents which contain complete, accurate, unbiased, and relevant information.

This approach is useful when designing survey questionnaires and preparing instructions since it is important to convey information clearly, accurately, concisely, and completely. It is important to ensure information is conveyed consistently across surveys. One approach to ensure consistency across questionnaires is to layout the information in a similar format and to include common data definitions.

“Plain” English is a knowledge management tool, which is useful in preparing survey documentation. The principles and practices of “Plain” English are intended to engage the audience, to express ideas clearly and concisely, and to use a visually appealing style. These techniques are summarized in Table 6 (next page).

VERIFIABILITY	Are the claims made verifiable? Are accurate, traceable sources of statements and statistics given? Are the statements made based upon first-hand knowledge or research or hearsay? Are unnamed sources used?
TIMELINESS	Is the information given current? When was the last time the page was updated? Are new sites or entries so designated?
RELEVANCE	Is the material truly relevant? Are the authors trying to compare apples and oranges? Is the material full of broad generalizations that are not clearly substantiated?
BIAS/fairness	Is the language used loaded? Are points of view given that shows a range of opinion? Are information producers from all stripes listed? Are the links only to sites of one or two segments of the issue? Are politically charged labels used frequently? Does the author resort primarily to emotional appeals?
ORDERLINESS	Is the page arranged in an order that makes sense? Can you identify the underlying assumptions? Are the points made throughout the page consistent?
CLARITY	Is the information clearly stated? Does the author use obscure language or fail to define important terms? Are statements ambiguous?
VALIDITY	Is the information given out of context? Are the data used compatible? Are there sufficient data to make a point? Are relevant data omitted? Do the facts as presented support the conclusions?
<i>Source: Michigan State University Library, 2004</i>	

<p>1. Engage your reader</p> <ul style="list-style-type: none"> ➤ Identify your audience ➤ Organize to meet your reader’s needs ➤ Use a question-and-answer format ➤ Use “you” and other pronouns to speak directly to readers (personalize) ➤ Use the active voice ➤ Use the appropriate tone
<p>2. Write clearly and concisely</p> <ul style="list-style-type: none"> ➤ Use short sentences ➤ Write to one person, not to a group ➤ Use the simplest tense you can ➤ Use “must” to convey requirements ➤ Place words carefully ➤ Use “if-then” tables ➤ Avoid words and sentence constructions that cause confusion ➤ Use contractions when appropriate
<p>3. Write in a visually appealing style</p> <ul style="list-style-type: none"> ➤ Use informative headings ➤ Write short sections ➤ Include only one issue in each designated paragraph ➤ Use vertical lists ➤ Use tested techniques to highlight important points
<p><i>Source :Bureau of Land Management, Writing User-Friendly, Documents</i></p>

A “Plain” English approach identifies the needs of the intended audience. For example, Frequently-Asked-Questions include questions regarding survey procedures (e.g., where and when to submit forms; and what data EIA is requesting. FAQs are intended to increase the response rate and accuracy of data submitted by respondents.

Writing clear and concise instructions is challenging. It is possible to improve instructions by reorganizing information, removing duplicative and irrelevant information. For example, during redesign of Form EIA-176, “Annual Report of Natural and Supplemental Gas Supply and Disposition” in 2002, the instructions were reduced from 10 to 5 pages. The result was a more precise and concise set of instructions and revised form.

Concept mapping, another knowledge management tool, conveys knowledge in a visually appealing style. Concept mapping seeks to facilitate understanding by representing “new information clearly and explicate conceptual relationships in the materials”.⁶

Concept maps communicate ideas and procedures, diagnose misunderstandings, and support meaningful learning by introducing and linking new facts and ideas with prior knowledge. Table 7 defines and illustrates three types of concept maps – hierarchy, flowchart, and spider concept maps.

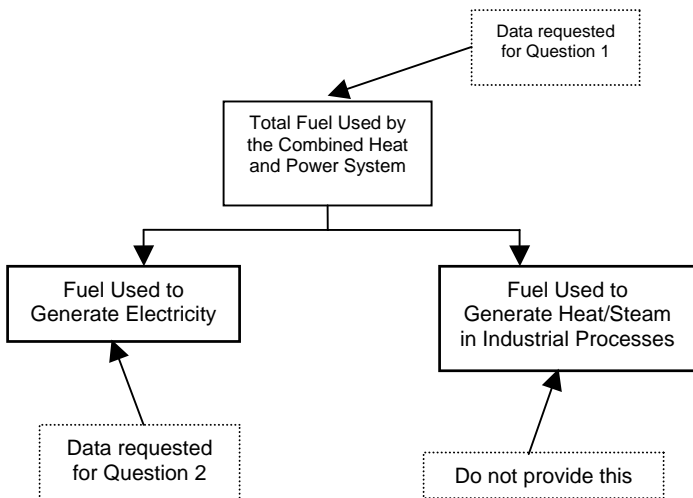
Type	Definition	Illustration
Hierarchy	Organizes information in hierarchy or levels in descending order of importance	Form EIA-920 Data Model
Flowchart	Organizes information in a linear or sequential format	CNEAF's Survey Process
Spider	Places the central theme in the center of the map and links subthemes	Kid's Page

Source: [University of Illinois at Urbana-Champaign](http://www.uiuc.edu)

A hierarchy concept map organizes information into levels. It is useful in organizational charts and to display data requirements. Figure 1 displays the relationship between concepts for fuel use and data collected on Form EIA-920, "Combined Heat and Power Plant Report".

The hierarchy map displaying the data requirements was used during pre-survey design visits and cognitive interviews to explain to respondents the data to be collected on Form EIA-920. Data requirements models are useful in establishing structure and order of the questions.

Figure 1: Data model for testing Form EIA-920, "Combined Heat and Power Plants Report"



A flowchart captures sequential steps or procedures. Figure 2, designed by the Office of Coal, Nuclear, Electric, and Alternative Fuels (CNEAF) displays the survey procedures. A flowchart is useful for both educating new employees and identifying methods to improve quality of survey system.

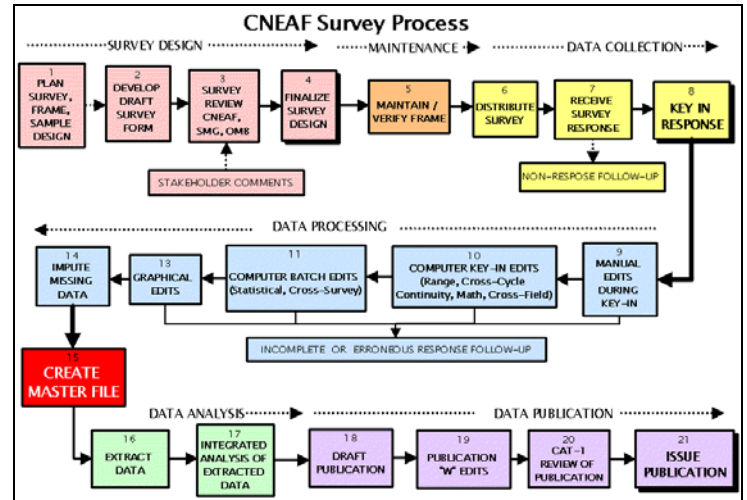


Figure 2: CNEAF Survey Process

A spider concept map is useful in organizing information around a central theme. The spider map in Figure 3 (next page) provides customers with information about contents on the Kid's webpage. This map catalogues information and assists users in locating information on a specific subject such as sources of energy which are further subdivided by source of energy.

Concepts maps are used to display information in a visually appealing manner and transfer knowledge to audiences with different levels of expertise regarding the subject matter. These tools can be useful when seeking to overcome obstacles to documentation, e.g. identifying data requirements and effectively communicating technical information.

What is an optimal investment strategy for survey documentation? An optimal investment strategy will minimize costs and optimize benefits to internal and external audiences. One possible optimal strategy is to develop a content management system. EIA is developing a prototype content management system, one which in theory will demonstrate it is possible to produce customized survey documentation and minimize investment in documentation.

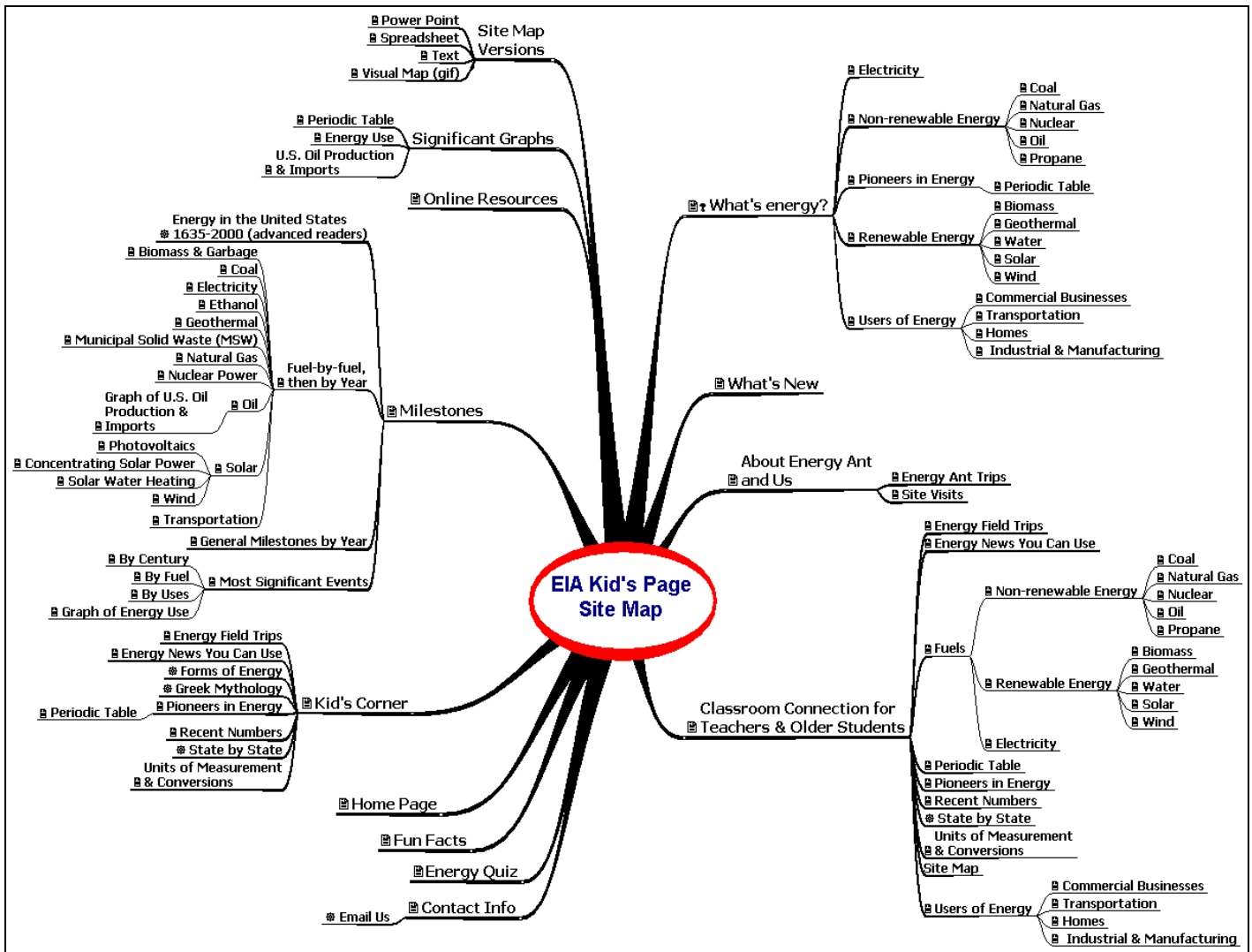


Figure 3: EIA Kid’s Page Site Map

The content management approach is cost-effective since it will save time creating documents by merging available or modified content with templates. For example, by reusing (and modifying) available templates, survey managers will save time creating survey implementing plans and operation’s manuals.

Information provided on instructions and survey forms concerning who must submit, where and when to submit survey forms can be reused in to create Frequently-Asked-Questions (FAQs). The content in the forms and instructions can be merged with the Questions and reformatted to create the list of FAQs for survey respondents. For example, [FAQs for Form EIA-176](#), “Annual Report of Natural and Supplemental Gas Supply and Disposition” contains content similar to information contained in the instructions.

A content management approach assists with getting started since templates are available to guide survey staff in gathering information during the design stage on what information is needed. Furthermore, as changes are made to procedures and statistical techniques, it is possible to quickly update details without revising an entire document.

A content management system permits survey managers and their staff to modify available text and to reuse it for other purposes. For example, information found in the Implementation Plan describing the purpose of the survey, frame, sample, and data collection procedures, can be easily modified and later included in the Operation’s Manual or Technical Notes of EIA publications.

Summary: Steps for creating a prototype content management system to test this concept are simple. Initial steps will include:

1. Identifying essential survey documentation;
2. Designing a content management system capable of producing survey documents;
3. Designing templates for reports, including technical notes, manuals, questionnaires, instructions, frequently-asked-questions;
4. Compiling paper and electronic survey documentation to use to create prototype documentation; and
5. Publishing documents – e.g., manuals and other documents.

Designing and implementing a Content Management System will support EIA’s mission, ensure compliance with federal regulations, and transfer knowledge to EIA customers, staff and survey respondents. And, these results are intended to be achieved through a cost-effective approach to survey documentation.

Endnotes

1. Energy Information Administration, [EIA’s Strategic Plan 2000-2005](#), p. iv.
2. Office of Management and Budget, 2002, [Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies](#).
3. Energy Information Administration, EIA’s Information Quality Guidelines.
4. FCSM, “Measuring and Reporting Sources of Error in Surveys”, Working Paper #31.
5. Energy Information Administration, EIA Glossary, available at http://www.eia.doe.gov/glossary/glossary_main_page.htm
6. Michigan State University Library at <http://www.lib.msu.edu/link/critical.htm>

References

Bureau of Land Management, Department of Interior, 2004, *Writing User-Friendly Documents*, available at http://www.blm.gov/nhp/NPR/pe_dgst1.html

Clarke, John H., 1990, *Patterns of Thinking: Integrating Learning Skills in Content Teaching*, Massachusetts, Allyn and Bacon.

Energy Information Administration, 2000, *EIA’s Form Directory*, available at <http://www.eia.doe.gov/oss/forms.html>

_____, 2002, *EIA’s Information Quality Guidelines* available at <http://www.eia.doe.gov/smg/EIA-IQ-Guidelines.html>

_____, 2002, *EIA’s Standards Manual* available at <http://www.eia.doe.gov/smg/Standard.pdf>

_____, 2004, *EIA’s Strategic Plan 2000-2005*, available at ftp://ftp.eia.doe.gov/pub/pdf/other_docs/s_pln00.pdf

_____, 2000, *EIA’s Record Management 2000 Policy and Procedures Manual* (EIA internal document).

English, Larry P., 1999, *Improving Data Warehouse and Business Information Quality*, New York, Wiley.

Michigan State University Library, 2004, available at <http://www.lib.msu.edu/link/critical.htm>.

Office of Management and Budget, 2001, Statistical Policy Working Paper #31, “Measuring and Reporting Sources of Error in Surveys,” available at http://www.fcsm.gov/reports/01paper/SPWP31_final.pdf

Office of Management and Budget, 2002, “Information Quality Guidelines” available at <http://www.whitehouse.gov/omb/fedreg/reproducible.html>

United Nations Statistical Division, 2001, *Handbook of Statistical Organization, Third Edition: The Operation and Organization of a Statistical Agency* available at <http://unstats.un.org/unsd/>

University of Illinois at Urbana-Champaign, 2004, <http://classes.aces.uiuc.edu/ACES100/Mind/c-m2.html>.