Form 1221-2
(June 1969)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

MANUAL TRANSMITTAL SHEET

Release
1-1705

Date
12/28/06

Subject

H 1283 1 - DATA ADMINISTRATION AND MANAGEMENT (PUBLIC)

1. Explanation of Material Transmitted: This release transmits the Bureau of Land Management's Handbook to accompany Manual Section 1283 – Data Administration and Management. This Handbook provides implementing instructions for the administration and management of data in accordance with guidance provided under the Information Quality Act (Section 515 of the "Treasury and Consolidated Agencies Appropriations Act of 2001"), the Paperwork Reduction Act of 1995, the Information Technology Reform Act of 1996 (also known as the Clinger-Cohen Act), as well as other related Statutes and implementing guidance.

2. Reports Required: None

3. Materials Superseded: None

4. Filing Instructions: File as directed below

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Acting Assistant Director,
Information Resources Management

Data Administration and Management Handbook

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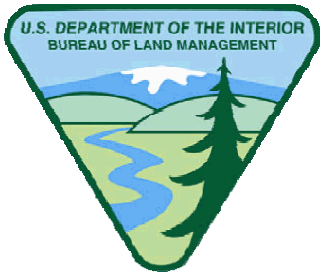

BUREAU OF LAND MANAGEMENT

Data Administration and Management (Public)

BLM Manual Handbook H 1283-1

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Chapter 1: Introduction

A. Definition of Data Management

1. Data is defined as a collection of information that is organized for analysis or used as the basis for decision-making (Webster's New Riverside Dictionary).

2. Data Management (DM) is the process under which data is organized and structured so that it can be used in a consistent manner as the basis of decision-making.

B. Characteristics of Quality Data

The Congress and the Administration have defined overall information quality as having the following characteristics:

1. Utility: Data is accurate, reliable, useful, and timely

2. Integrity: Data is free from contamination.

3. Objectivity: Data is unambiguous and collected under the same procedures and rules.

4. Relevancy: Data is collected and managed according to a standard set by the information customer.

5. Quality: Data meets the specifications the organization has identified.

C. Goals of the Data Resources Management (DRM) Program

The Data Resources Management Program will achieve data quality by:

1. Preserving the integrity of data;

2. Eliminating redundant data;

3. Providing clearly defined data; and

4. Establishing and enforcing data standards.

D. The DRM Program seeks to achieve the goals defined above by

1. Providing data analysis experts to fully support the BLM's Data Stewards in information creation, use, and dissemination activities.

2. Training BLM employees so that their data responsibilities are known and understood across the BLM organization.

3. Assisting in the development and maintenance of data definitions and standards commensurate with the value of information to BLM and to the public.

4. Identifying the governance and stewardship procedures to achieve these goals.

E. Scope of Data Resources Management

The DRM program is concerned with all types of information produced by BLM, including all Public, Non-public, Confidential or Sensitive Data, regardless of whether collected, maintained, or displayed spatially, using alphanumeric characters, in graphic form, or on paper.

F. Authorities

The authorities for data management activities are identified in BLM Manual Section 1283, which provides overall policy direction for the Data Administration and Data Resources Management program. In addition, BLM Manual 1278 includes policy involving data sharing activities. Those Manuals reference the legal authorities involving data resources management and data sharing.

G. Operating Principles Concerning BLM Data

1. All BLM data is corporate in character even though it is entered and maintained at a local level.

2. BLM will have one set of corporate data standards and definitions, regardless of whether data is spatial or not.

3. States, Centers, and Field Offices may maintain data and data standards to meet local requirements but such data is still considered corporate and must conform to Bureau data standards.

4. BLM personnel are accountable for the data they produce.

5. The data steward documents the accuracy standards for data recognizing the limits of time, budgets, and priorities. The Data Steward also identifies those who are allowed access rights and are, thereby responsible for the integrity of the data

6. The method of collecting data used for government actions, decisions and decision-making may be open to scrutiny by the public, other agencies, and outside institutions.

7. The BLM will manage a Corporate Metadata Repository (CMR) to house its corporate data standards and models. Local data standards and metadata shall be compatible with the CMR and will be identified in special State/Center/Local Office Data Dictionary supplements to the Bureau's CMR, with sources identified.

H. Reference Guide to Performance Measures

The BLM is committed to objective and systematic measurement of its performance as a tool for tracking progress toward attaining its goals and a means of identifying opportunities for improvement. These fundamental practices found in the U.S. General Accounting Office (GAO), Accounting and Information Management Division, Executive Guide, Measuring Performance and Demonstrating Results of Information Technology Investments, Washington, D.C., GAO 1998, GAO/AIMD-98-89. The GAO considers Information Technology (IT) performance management and measures to be tied to the agency's Mission Strategic Plan.

I. Data Life Cycle

Data can be considered to have a life cycle from conception to destruction that parallels the life cycle from birth to death. Figure I-1 demonstrates the recursive nature of the data life cycle and how the development of the data moves from one segment of the life cycle to the next. It includes the following phases:

1. Planning for data needs: which includes the development of data requirements.
2. Acquisition of data: Data collection and verification against the original record.
3. Data Maintenance: The procedures for maintaining data including version and change control.
4. Data Access: The privileges and permissions associated with accessing data.
5. Evaluating data: The verification and control procedures associated with data.
6. Archiving data: The retention of data and its retirement into archival storage.
7. Quality assurance and control: The processes in place to ensure data accuracy and integrity.

This Handbook will concentrate on the planning aspects and quality assurance of data. Manual 1278 discusses data and information access and information sharing. More information about the Data Life Cycle can be found in the Data Management Toolkit, found at http://web.blm.gov/data_mgt/dmp/toolkit/datamainthome.html.

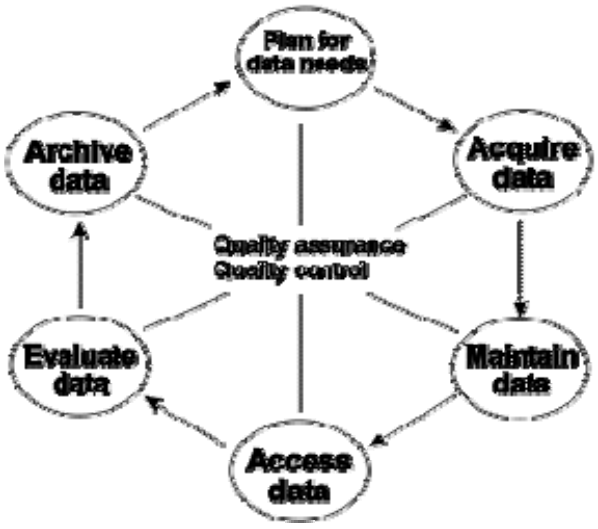


FIGURE I-1 Data Life Cycle

Chapter 2: Assessing Data Quality

A. Basis for Acceptable Quality Level

Quality levels are established to guide the collection, correction, and quality control of data supporting the BLM program activities. The results of data analyses will help the Bureau determine the minimum data integrity and quality levels it will accept for each corporate database. Meeting or exceeding these data quality levels will improve decision-making; provide supporting evidence in judicial proceedings; and enhance data currency and maintenance over time.

B. Determining Acceptable Quality Levels

The Data Stewards are responsible for establishing the acceptable quality level based on the needed accuracy of the data collected and maintained. The Data Administrators act as advisors and analysts in helping the Data Stewards establish acceptable quality levels. The acceptable quality level is a combination of the accuracy level desired and a measure of confidence that the desired accuracy level has been reached. For instance, a program might define a general acceptable quality level as 95% accuracy, with a 95% confidence level that the level of accuracy has been met (i.e., we feel 95% confident that at least 95 out of 100 entries are correct).

C. Quality Review Teams

The Data Stewards should use Quality Review Teams to assist them in developing quality levels. Those teams consist of Subject Matter Experts (SMEs) familiar with the program and the data standards along with quality assurance personnel. SME Teams provide the subject matter expertise and coordinate the review of Quality Assurance (QA) efforts and perform the data quality reviews. These teams are also responsible for the QA aspects of data for initiatives and programs throughout the life of the standard, with membership changing as needs change.

D. Quality Review Techniques

The BLM implements a consistent methodology for ensuring accurate data entry, as well as the use of data sampling for computing and assessing the accuracy of the data to determine data quality. They include:

1. Quality System reviews.

   The Information Resources Management (IRM) program includes a monitoring and evaluation component to oversee the success of its Information Technology (IT) projects approved by the Information Technology Investment Board (ITIB). These reviews can be used to assess data quality as well. They consist of three major activities:

   - An assessment of the risks associated with the Project Plan, (including data management activities) and a determination of whether the project should be approved.

   - Review and oversight of the approved plan to ensure that milestone deliverables are met, and those customer requirements are satisfied.

- Evaluation of project success and shortcomings once the systems are designed and delivered to the customer.

2. Management oversight and controls, including employee performance reviews.

   - Employee Performance Appraisal Plan (EPAP)
   - Peer review
   - Product review
   - Random sampling to detect errors
   - Edits
   - Training
   - Management Control Reviews and Assessments

D. Data Audits and Reviews

Data Audits and Data Reviews are of great value to check data quality and a very effective means to improve it. Data Audits are formal assessments, while Data Reviews are unscheduled assessments of the adequacy of data collected and the processes used to collect and verify the accuracy of the data. All steps taken must be documented and managed as an official agency record. The steps to conduct audits or reviews are provided below.

1. Identify key items that need to be assessed.

Periodic data assessments are required for every BLM Program with DRM program involvement. Assessments may be formal audits or informal data reviews as directed or required in appropriate QA Plans.

The appropriate National Data Administrator will:

a. Periodically review applicable QA Plans to confirm the need to conduct audits as scheduled;

b. Review information provided that questions the veracity of data contained in a DRM program and confirm the need to conduct a review that is not scheduled in the applicable QA Plan;

c. Review previously collected data audit or review information, if any, and decide if an audit or review is warranted;

d. As applicable, recommend that an audit or review be conducted and propose an approach to conduct the audit or review;

e. Advise the Bureau Data Administrator and appropriate Program Lead of the need and proposed approach to conduct a data audit or review;

f. Conduct sufficient investigations and research required to develop a preliminary proposal to address how to proceed with the proposed data audit or review. Information included in the preliminary proposal should be sufficient to allow the Program Lead to ascertain that sufficient funding and resources are, or will be, available to conduct the proposed data audit or review in the requested time frame; and

g. Submit the proposal to the Program Lead and Bureau Data Administrator for concurrence with the proposed data audit or review.

2. Confirm approach and prepare audit plan.

Upon receipt of approval from the Program Lead, the National Data Administrator will:

a. Finalize the approach;

b. Prepare the proposed plan to accomplish the audit or review;

c. Detail the labor required to plan for and conduct the proposed data audit or review;

d. Project duration for the effort; and

e. Estimate the total costs (labor and other directs costs) to prepare for and conduct the proposed data audit or review.

The Team Leader will:

a. Confirm the documented approach and cost estimates (or make required adjustments and, if necessary, obtain approval to proceed);

b. Prepare the final data audit or review plan;

c. Submit the final data audit or review plan to the Program Lead, the appropriate National Data Administrator, and the Bureau Data Administrator for review and concurrence.

3. Preparing for the audit or review.

The Team Leader begins the data audit or review plan preparation process at the appropriate time following receipt of approval by:

a. Assembling the team that will conduct the audit or review;

b. Developing or obtaining audit aids to support the conduct of the audit or review such as audit data recording forms, application process guides; sample data sheets, previous audit aids, etc.;

c. Soliciting and obtaining relevant information from the activity(s) to be audited such as applicable standards, requirements, prescribed procedures, baseline comparison data, previous audit results, data samples. etc.;

d. Identifying audit or review targets (i.e., specific data or data types, specific processes, procedures, or reports) to be assessed in accordance with the sampling plan documented in the audit plan; and

e. Notifying activity(s) to be audited of their preparations and provisions necessary to support an efficient and effective audit or review.

4. Conduct audit or review.

The Team Leader, in accordance with direction from the National Data Administrator, and in concert with management approval, will conduct the audit or review of the data. Procedures used to collect and process the data shall be in accordance with the sampling techniques and procedures specified in the approved audit or review plan. The Team Leader and the Team will:

a. Obtain representative data during interviews with participants;

b. Observe data collection and data recording activities;

c. Examine actual data samples and data collection records;

d. Exercise data processing systems and review resulting reports or output;

e. Compare data samples with observed or expected results;

f. Resolve and document any issues or discrepancies that occur that may impact the veracity of observations or audit data collected;

g. Record findings and observations; and

h. As a courtesy to the activity audited, discuss and review preliminary and potentially significant findings and results with appropriate activity personnel.

5. Assess findings.

Upon completion of the data collection efforts as described above, the audit Team Leader and the Audit Team will:

a. Review the data collected to identify deficiencies in the data or in the systems or procedures employed to collect or process the data;

b. Identify exemplarily processes or procedures observed that may be appropriate for extension to other DM programs or initiatives;

c. Review or discuss the data collected with other BLM applications with similar data requirements to ascertain potential impacts of deficiencies or issues uncovered during the audit on related DM programs or initiatives, as appropriate;

d. Determine the significance of deficiencies found to the application under audit or review and categorize deficiencies found as:

i. Major deficiencies requiring significant investment to change systems or processes, or impacting more than one application; or

ii. Minor deficiencies impacting only the processes, procedures or data of the application undergoing audit or review and not requiring significant investments to change systems;

e. Ascertain the value of the deficiencies and estimate the potential costs and benefits to correct or alleviate each deficiency (i.e. a very brief cost – benefit analysis); and

f. Coordinate draft findings and results with the audited activity(s) to open a dialogue to help resolve any contested items in advance of the audit report, and to obtain concurrence or acceptance of findings and results for those deficiencies without controversy.

6. Prepare audit or review report.

The Audit Team prepares an audit or review report that documents audit findings and presents recommendations and a plan to resolve any deficiencies found during the audit or review. Recommendations may propose that no actions be taken due, either to the fact that no deficiencies were recorded, or that the apparent costs to correct deficiencies exceed the potential benefits that may accrue. Recommendations may propose that the Bureau invest significantly to correct major deficiencies. The recommendations resulting from an audit or review may encompass both of these extremes and/or have findings that fall in between these extremes.

The Team Leader and the Audit Team will prepare an audit report that:

a. Documents audit or review findings;

b. Documents methodologies used to collect and assess the data collected;

c. Presents alternative solutions explored to correct or resolve deficiencies uncovered;

d. Records analysis findings and conclusions;

e. Prioritizes recommendations;

f. Presents a recommended plan (high level costs and schedule) to correct or resolve deficiencies that warrant correction; and

g. Forwards the Audit or Review Report to the Program Lead, National Data Administrator, and the Bureau Data Administrator.

7. Accept audit or review report.

The Program Lead and the National Data Administrator review the Audit or Review Report for concurrence or request resolution of comments, as applicable. They will collaborate on the appropriate course of action for the BLM to follow, based upon findings and recommendations presented. Accepted major recommendations are candidates to become data management programs or data management initiatives. Accepted minor recommendations become locally administered actions to improve or enhance data and operations within the audited application. When authorized by the Program Lead, processes and procedures are modified, and data is

converted as necessary, to attain the data quality desired. Operations continue as before, and data quality continues to be monitored as specified in the QA Plan.

E. Information Quality Guidelines

Section 515 of the Treasury and General Government Appropriations Act for FY2001 (Public Law 106-554) directed the Office of Management and Budget (OMB) to 1) issue information quality guidelines ensuring and maximizing the quality, objectivity, utility, and integrity of information, including statistical information, disseminated by Federal agencies; 2) establish an administrative mechanism to receive complaints on data quality; and 3) report to the Director of OMB the number and nature of complaints received by the agency concerning the quality, objectivity, utility, and integrity of information and how such complaints were resolved. The OMB issued its guidelines for federal agencies February 22, 2002 (67FR8452). The BLM Information Quality Guidelines are located at http://www.blm.gov/nhp/efoia/data_quality/.

1. Contents of Data Quality Correction Request.

   As required in Section III, Information Quality Challenge and Review Procedures of the Information Quality Guidelines, the following four elements should be included in a challenge to information:

   a. Specific reference to the information being challenged.

   b. A statement specifying why the complainant believes the information fails to satisfy the standards in the BLM, the DOI, or OMB guidance.

   c. How a complainant is affected by the challenged information. The complainant may include suggestions for correcting the challenged information, but that is not mandatory.

   d. The name and address of response of the person filing the complaint. This information is used at the complainant's request for the purpose of responding to the challenge initiated by the individual. The address of response need not be the complainant's home address but should be the address that the BLM will use to respond to the complaint.

2. Data Quality Correction Process.

   a. Complaint under Section 515 of the Act must be filed at the office responsible for the data.

   b. The BLM office responsible for the data reviews the request and responds to the complainant. The BLM office may dismiss if the complaint is considered frivolous, made in bad faith, trivial, unnecessary to respond to, duplicative, or unduly burdensome.

   c. If the response from the BLM office is not satisfactory, complainant can file a request for reconsideration with the BLM Chief Information Office (CIO).

   d. The CIO, deemed a neutral party, will investigate and respond.

   e. If the CIO response is inadequate, the request is made to the BLM Director.

   f. If the BLM Director response is not adequate, the request is made to the Assistant Secretary for Policy, Management and Budget, Department of the Interior.

g. If Agency (Department) response is not satisfactory, court action may be initiated.

3. Reporting Requirements.

The BLM will provide DOI with a report detailing the number and nature of complaints received under Section 515 of the Act annually and will place their responses on the BLM public website. The BLM Year-End Information Quality Report for FY 2005 is as follows:

BLM YEAR-END INFORMATION QUALITY REPORT FYxx		
Requests for Correction Received FY 2005		
I. Department Name: U.S. Department of the Interior		
Agency: Bureau of Land Management		
Web page location agency information quality correspondence: http://www.blm.gov/nhp/efoia/index.htm		
Number of Requests Received	**Number Designated Influential**	
1	0	
Total: 1	0	
The Bureau of Land Management has brought no actions forward into FY 2006		
II. Number of Requested Recd in FY04 Responded to in FY05	**Number of Appeals Received in FY04 Responded to in FY05**	
0	0	
III. Agency Receiving Correction Request: Bureau of Land Management. U.S.D.I.		
Requestor: Colorado Environmental Coalition		
1000 North 9th Street		
Grand Junction, Colorado 81501		
Date Received: June 2, 2005, by email		
Summary of Request: Challenge to the analysis as part of the "Reasonable Foreseeable Development Scenario" used in the Road Plateau Land Use Planning Area. The Planning document was disseminated for public comment and is now considered draft subject to changes based on the comments received. The Colorado Environmental Association also provided the same comments as part of the planning process.		
Description of Requested Correction: The challenge is on the projections made and used as the basis of one of the alternative scenarios proposed for planning decisions. It challenged the basis of the projections used in that particular scenario and the corresponding conclusions that were drawn from it.		
Influential: No		
First Agency Response: Completed and responded to by BLM on June 7, 2005		
Resolution: The complaint was dismissed under the Information Quality Act because an alternative adjudication was available under the National Environmental Policy Act (NEPA) and the Planning process. The comments will be addressed separately as part of the responses to that process.		
Judicial Review: None		
Appeal Request: None		
Summary of Request for Reconsideration: Not applicable		
Type of Appeal Process Used: Not applicable		
Appeal Resolution: Not applicable		
Contact: Jim Horan, BLM Data Administrator Ph # 202-452-5023		

FIGURE I-2 Data Correction Request and Response Summary Form

Chapter 3: Estimating Data Costs

A. The Cost of Data in Information Technology (IT) Investments

Costs associated with acquiring and maintaining the data contained in systems making up an IT investment cannot be overlooked when estimating IT investment costs. Presently, no rule-of-thumb estimations for determining data costs exist. This means it is not possible to state the data component of a software application system is a fixed percentage of the total cost. In some software application systems, data costs are the overriding expense, while in others; data costs are a small fraction of the total cost. Since no estimation of the data costs as percentage of the total investment costs can be made, it is necessary to look at every software application system separately, mapping out the corresponding costs as a function of the activities involved during the system's data lifecycle.

The Bureau of Land Management (BLM) is improving how it selects its Information Technology (IT) investments. Federal law and Office of Management and Budget (OMB) policy mandate that BLM determine and control its IT investment costs with increased accuracy. The BLM has implemented the Government Accountability Office Information Technology Investment Management (ITIM) process. More information on the ITIM process can be found at http://web.blm.gov/itim/itimp/index.htm.

One requirement of the ITIM selection process is that all projects complete a cost benefit analysis prior to approval. The document, "Developing the Financial Analysis for a BLM Technology Proposal" explains cost benefit analysis and provides spreadsheets that can be used in completing this type of financial analysis. See http://web.blm.gov/itim/roi/financial_analysis_v1-02.pdf.

This Chapter was prepared to provide supplemental information to assist project managers and proponents in estimating one particular set of costs—data costs. Data costs are those associated with acquiring, manipulating, maintaining, and archiving data.

B. Data Life Cycle

Using the data life cycle as our guide, Figure II-1 demonstrates the recursive nature of the data life cycle and how the development of the data moves from one segment of the life cycle to the next. The figure also illustrates the critical importance that quality assurance and quality control has in each segment of the data lifecycle. More information about the Data Life Cycle can be found in the Data Management Toolkit, at http://web.blm.gov/data_mgt/dmp/toolkit/datamainthome.html.

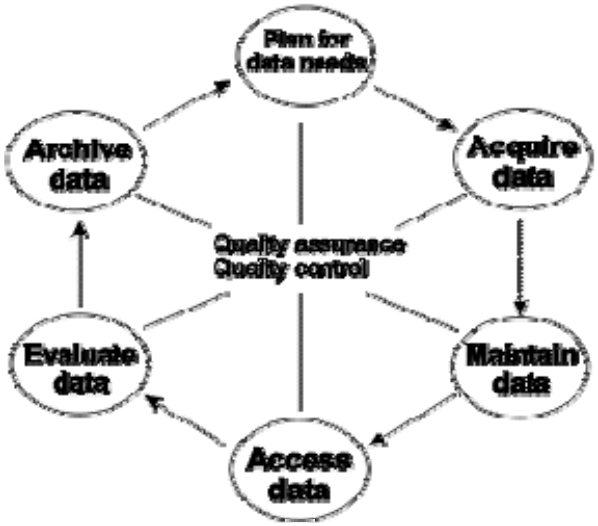


FIGURE III-1 Data Life Cycle

C. IT Investment Stages: Select, Control, and Evaluate

To be able to effectively relate data costs when they are incurred to other costs associated with the development of an IT investment, the segments of the data life cycle must be related to Select, Control, and Evaluate phases of the Capital Planning and Investment Control Process established by OMB and the Government Accountability Office. That relationship is diagramed below.

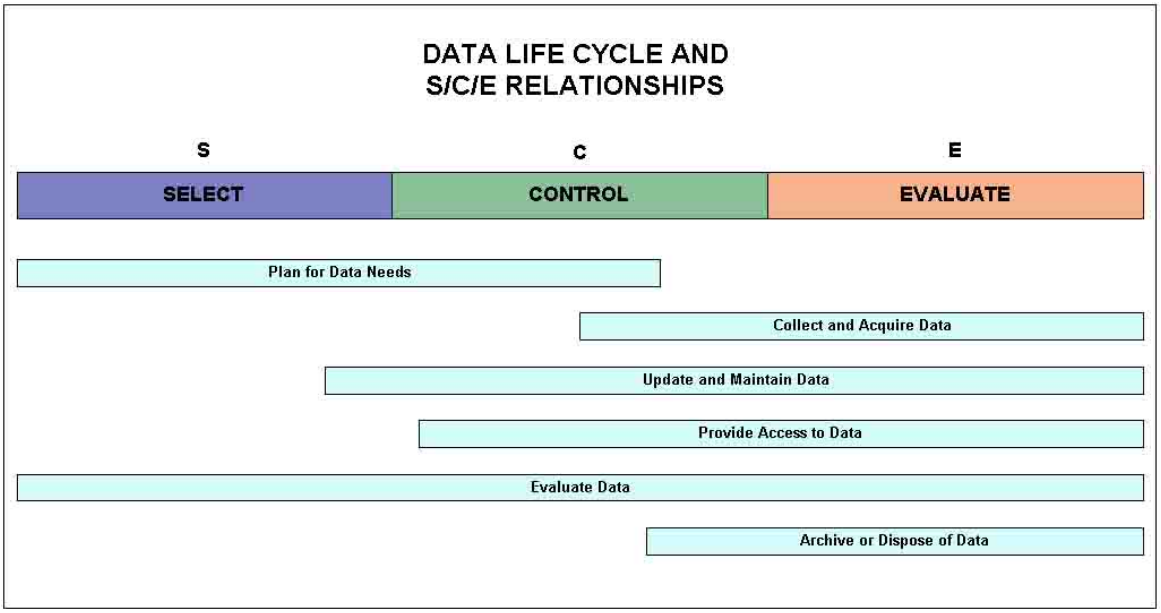


FIGURE III-2 Data Life Cycle and S/C/E Relationships

In the remaining pages of this Chapter other diagrams will relate each segment of the data life cycle, and the activities contained within it, to the phases of the ITIM process. For each segment of the data life cycle, the activities necessary to plan, acquire, maintain, access, evaluate, and archive the data stored in IT systems are described. Brief discussions of the associated cost are also provided. If a discussion of data costs for an activity is not provided, it is assumed that the related costs are direct or indirect labor costs to perform, supervise, and document the activity. See http://web.blm.gov/sco/financial_analysis_v1-02.pdf for more information on calculating direct and indirect labor costs including required overhead estimates. After reviewing this Chapter, an IT project manager should be able to complete the data costs worksheet provided in Appendix A to the required level of detail across the same timeline as the other costs for their projects. Appendix B provides a listing of federal orders, acts, and circulars relevant to data costs and Appendix C provides a listing of useful data management websites.

D. Planning for Data Needs

Prior to any data acquisition or system development, the business process needs to be understood, and data needs clearly identified. How will the data be collected, what is the schedule and budget for the collection, how will that data be checked and certified? What are all the likely uses for the data, which users will access it, what kinds of outputs will be needed? How do these impact the needs to store, access, and protect the data? Once the business data needs are determined, a system to store and manipulate the data can be identified and developed. Developing an understanding of business requirements is the main thrust of activities performed in planning for data needs and is the main data cost for this segment of the data lifecycle. The following activities and their associated costs must be considered when developing data cost estimates for planning for data needs

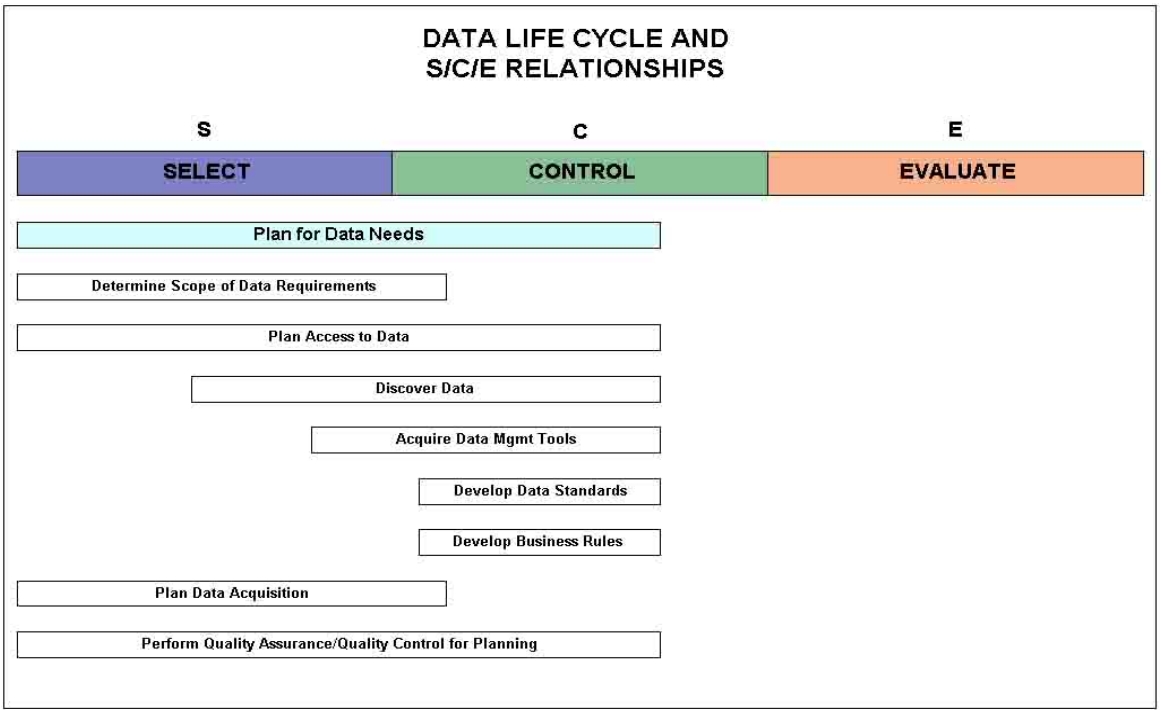


FIGURE III-3 Plan for Data Needs S/C/E Relationship

E. Determining and Documenting the Scope of the Data Requirements

A project's scope and the data requirements' scope may not be exactly the same. For instance, a project may be creating an application to deal with tracking the location of a wild horse or burro. However, to understand the relationships to other (or future) applications, the data scope may include wild horse and burro facility and adoption information.

The costs incurred to perform the Determining and Documenting the Scope of the Data Requirements activity will be listed on line 5 of the Data Costs Worksheet Appendix A. (Note: To view the worksheet line numbers while viewing this document electronically, left click on the worksheet.)

F. Plan Access to Data

The stakeholders must have access to all information available both during development and implementation of IT systems. Analyzing stakeholders to determine which of them will be users or reviewers of IT systems is an identified data cost. The costs incurred to perform the Plan Access to Data activity will be listed on line 6 of the Data Costs Worksheet Appendix A).

G. Determining Data Requirements

Understanding the business requirements for data is vital for any business. This includes the current data in applications, on paper, in personal stores and required data that aren't currently collected. All data discovery should include the following activities:

1. Discover Business User Requirements

   This activity may be accomplished several ways, such as through Business Process Re-engineering (BPR), BPR services are available through the BEA, through contract, or by using BLM resources (possibly within a project). The cost of having data professionals participate in BPR sessions and user meeting are data costs must be included as either direct or indirect costs.

2. Identify Stakeholders

   Stakeholders can be defined as anyone with specific knowledge or interest in the subject matter of the IT investment being developed. Stakeholder identification costs are part of this segment.

3. Identify, Gather, and Review Relevant Documents

   Statements of work, current contracts, surveys, formal studies, and white papers are all possible sources of data requirements. Time spent reviewing these documents is another data cost.

4. Conduct Interviews

   Formal and informal interviews with the identified stakeholders may be conducted to document requirements. Actually sitting with some of the information providers and using any existing applications or documents may be of value in identifying new data

requirements, validation of data relationships and business rules, and other possible areas for improvement.

5. Conduct Facilitated Sessions

   Getting stakeholders together in a facilitated group can be used to acquire requirements and/or validate requirements. Joint Application Development (JAD) type sessions, BPR Lab group meetings, or any method that focuses intent and provides documented agreement among the stakeholders.

   It is probable that more than one session will be necessary to capture and validate requirements.

6. Conduct Surveys

   Customer Surveys (internal and/or external) that cover specific topics can be useful in acquiring requirements. If surveys are proposed, ensure the cost for developing the survey, obtaining approval, survey distribution and collection, and results analysis and interpretation are included.

7. Conduct Reviews

   Formal review sessions may be required to validate the findings of the many data discovery activities. The costs of hosting sessions and, if necessary, the travel costs of participants are possible data costs in this segment of the lifecycle.

8. Create Logical Data Models

   In order to capture the business data requirements in a compact and easy to understand format, formal data modeling will be required. The models produced should include all data required by the business, regardless of whether the data currently exists. After the requirements are known, the possible sources can be researched.

   a. Create Conceptual Data Model

      This level of modeling is called the Conceptual Data Model. It includes:

      - Major entities with standard names and descriptions
      - Major relationships between entities (may include cardinality, if known)

      Data elements are usually not included at this step, but identified keys may be added.

   b. Create Detailed Logical Data Model

      This model includes:

      - All entities and data elements with standard names, descriptions and required information (see Best Management Practices for Incorporating Data Management into IT Projects)
      - All domain values for coded data elements
      - All keys for entities

- Business Rules
- All relationships between entities, including subtypes (and discriminators) and cardinality

c. Create Data Profile Information

Looking at the actual data within existing applications can provide a significant amount of information about existing data elements, business rules, and error conditions that already exist. This information can be used to validate such things as user requirements, existing documentation, and the data models.

Within-table profiling provides information such as keys, nulls allowed, and counts. Comparison table profiling provides information such as duplicate elements, counts, and foreign keys.

d. Analyze Impact of Data Change

Reports on keywords can help discover data overlaps, information about the data elements (size, type, description, etc.), and identify applications that might be effected by change to those data elements.

Custom data element searches can provide more detailed information in different formats than the standards reports, including counts, comparisons and domain details.

e. Search for Common Data Elements (CDE)

Reports from the Corporate Metadata Repository (CMR) can provide information about any identified CDE in the CMR. They include information about the standard name, description, domain values, and the logical data elements, and applications that are connected to it.

The CMR provides information about CDEs and may be used in the investment's development. Cde development and reconciliation is another potential data cost. The CDE development and reconciliation process may occur as part of data standard development activities that will be discussed in a following section.

f. Determining BLM Enterprise Architecture (BEA) Ties

The BEA website (http://web.blm.gov/bea/documentation.htm) contains data definitions for the high level Data Subject Areas (DSA), along with the Conceptual Logical Model and the current Detailed Logical Model. The BEA maintains the relationships between data, applications, processes and technology. This information can be used in many ways to help with requirements identification and should be investigated. Already known relationships to applications, processes and technology can provide insights into identification of additional stakeholders, applications, and projects that can be of value to a data discovery effort.

The BEA is an ongoing effort that builds information about the BLM over time. It is vital that new models and information gained through Data Discovery be incorporated into the BEA repository. In this way the BLM gains a clearer knowledge and understanding

of our business with each project/effort we undertake. The cost of reviewing the BEA data architecture and updating the architecture is a data cost.

The costs incurred to perform the Discover Data activities will be listed on line 7 of the Data Costs Worksheet Appendix A.

H. Acquiring Data Management Tools

Planning for the acquisition of data management tools is one data activity in this segment of the data lifecycle. Some data tools, such as design and analysis tools will be purchased and used in this life cycle segment. Others, such as data archival tools, will not be required until the Maintain Data segment. The five major classes of data management tools are:

1. Design/analysis tools
2. Data transformation tools
3. Data conversion tools
4. Data scrubbing tools
5. Data archival tools

Each of the tools have specific application to data quality:

1) Design/analysis tools are hardware or software that will assist in the process of identifying and documenting required data, processes, rules, reporting, software, and hardware for a business area. The tools identify what is done and how it is implemented for that business area; the tools may be data flow diagrams, data dictionary, entity relationship diagrams, use cases, state transition diagrams, code and schema generation capabilities, design models, class diagrams, structure charts, interface-flow diagrams, activity diagrams, sequence diagrams, component diagrams, deployment diagrams, and collaboration diagrams.

2) Data transformation is achieved by hardware or software that assists in the process of defining and applying algorithms to change data from one form or domain value set to another domain value set in the target data architecture.

3) Data conversion tools facilitate the process of preparing and re-engineering data to be loaded to the target architecture.

4) Data scrubbing tools identify and correct errors in order to improve data quality to an acceptable level.

5) Data archival tools facilitate the retirement of historic data.

The steps for acquiring data management tools are the same no matter what kind of tool is being considered. First, to comply with Bureau and OMB policy, if it is at all possible the work should be contracted out to another office, another agency, or a service Bureau. The Data Management Branch has expertise in data modeling and data analysis and the necessary tools to support data analysis for an IT project.

If an appropriate service provider cannot be located, the purchase of commercial off the shelf (COTS) or government off the shelf (GOTS) software should be considered. These tools can be very expensive, first year costs of $100,000 to $500,000 are not uncommon for some of these tools. The costs of training staff in the use of these tools and developing plans and procedures for tool use are additional costs for this option.

If neither a service Bureau nor a COTS/GOTS software source can be identified, then custom software will have to be coded and installed. Given the wide variety of services, COTS and GOTS software available to support data management, custom software development should never be necessary. If service Bureau or COTS/GOTS software sources cannot be identified, contact a state or national data administrator or the Data Management Branch (WO-570) for assistance.

All costs associated with planning, justifying, acquiring, installing, testing, and maintaining data management tools will be listed on line 8 of the Data Costs Worksheet (Appendix A).

I. Developing Data Standards

Once the need for a data standard is identified a request for the appropriate National Data Administrator to provide the new standard is made. A team is appointed and proposal is developed. Once the data standard proposal is approved, it triggers all the steps required to accomplish the adoption of the data standard, e.g. research, coordinate, draft, obtain consensus, and complete a data standard. The new data standard is documented in the "Data Standard Report".

If the adopted data standard requires changes in existing data or required new data to be collected a data standard implementation plan is developed. This plan prioritizes and schedules the transition of existing data and new data collection to the new standard. The plan should include all elements of a project plan, to include scope, objectives, success criteria, methods, responsibilities, work breakdown, schedules, budgets and risk assessment.

The costs incurred to develop data standards required to implement an IT investment are entered on line 9 of the Data Costs Worksheet (Appendix A).

J. Developing Business Rules

Business rules describe what the business does and why, and they provide a formal structure for understanding business operation. Business rules assert structure, control, and influence on business behavior. Detailed instructions for creating and maintaining business rules can be found in Chapter 5 of this handbook.

Identifying and documenting business rules should occur during business process analysis, data standards development, business case development, and/or system requirements development. Business rules should be defined or described by the business and technical users they affect-they are generally the ones with the knowledge and history of why and how their business tasks are accomplished.

Business rules will be delivered to the Data Management Branch (WO-570) and stored in the CMR so that they are available to the BLM business and technical users for analysis. They permit impact analysis as rules, laws, policies, and procedures, etc. change over time

Business rule development in BLM is a multiple step process that can be grouped into three divisions as follows:

1. Business Rule Request

   - The Data Stewards coordinates with the Bureau Data Administrator and appropriate State and Field Office to draft a business rule.

   - Requester searches the Business Rule Repository in the CMR for duplicates or conflicts (the data management staff can assist with this).

   - Requester enters required information into the business rule collection form (electronic version preferred).

2. Coordination and Comments

   - Requestor solicits comment from Bureau Data Administrator, Data Management Branch (WO-570), Data Administrators, Subject Matter Experts, other program managers, and any other interested parties (this list may vary depending on level of business rule)

   - Requester incorporates comments as appropriate

3. Incorporate Business Rule In Repository

   - Data Management Branch adds business rule to repository.

   - Data Management Branch notifies requester that business rule has been added.

   - Requestor verifies that business rule was entered correctly.

   - Data Management Branch notifies all interested parties.

The costs incurred to develop business rules for an IT investment are entered on line 10 of the Data Costs Worksheet (Appendix A).

K. Cost Planning for Data Acquisition

Once the data standards used in the investment have been determined, the planning for data acquisition can begin. The planning may be for field collection of the data, buying the data from a service provider or transferring data from another system, either on a one-time basis or as part of a data sharing or exchange agreement. Developing field collection plans, data transfer agreements, data conversion plans, and data sharing and exchange formats and agreements are all possible costs of this activity. Developing or modifying security plans and disaster recovery plans is another data acquisition activity.

The costs incurred to perform the Plan Data Acquisition activity will be entered on line 11 of the Data Costs Worksheet (Appendix A).

L. Quality Assurance /Quality Control Plans

Developing quality assurance plans and performing reviews (quality control) to assure that completed data models and plans have been completed according to quality guidelines are expected costs for this segment of the data lifecycle.

The costs incurred to perform the Quality Assurance /Quality Control for Planning activity will be entered on line 12 of the Data Costs Worksheet (Appendix A).

M. Costs for Collecting and Acquiring Data

Collect and acquire refers to not only "on the ground" collection but acquisition of existing data from state, federal, and private sources. Suitable metadata also will need to be developed to describe the data. Collection protocols should be established and followed. Figure 4 relates the timeline for the activities in the "Collect and Acquire Data" life cycle segment to the three phases of the ITIM process.

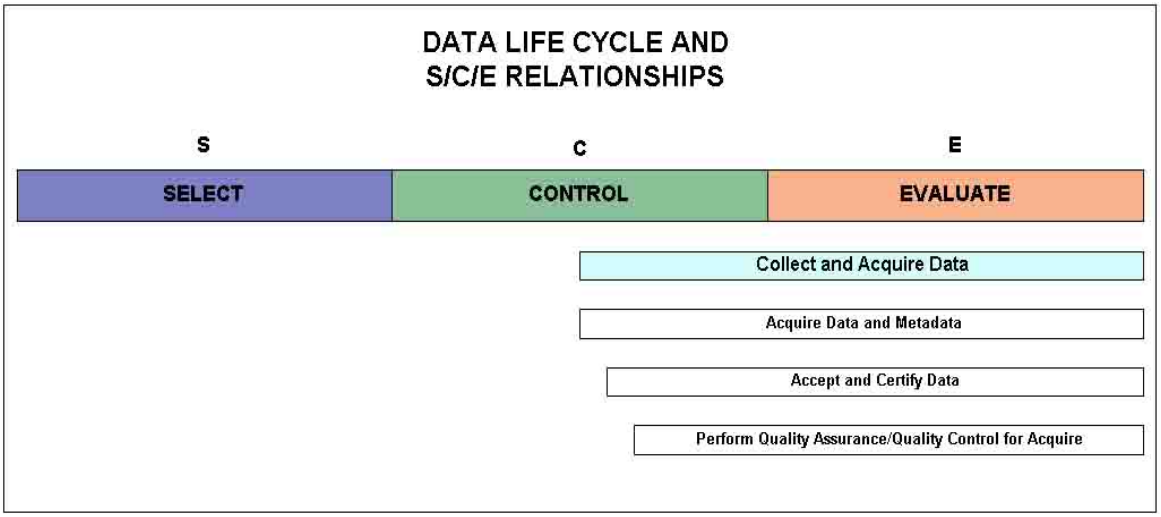


FIGURE III-4 Collect and Acquire Data S/C/E/ Relationships

N. Acquire Data and Metadata

In this segment of the data life cycle, actual data and metadata will be collected or otherwise acquired. If field collection of the data was planned, that collection will take place now. Data purchase agreements will be exercised and data sharing and agreements and methods will be exercised. Data collection costs include labor, travel, data entry, quality control, and supervision and can be a substantial portion of the total data costs.

All data acquisitions must follow current data management guidance. Refer to the document "Coordination and Approval of Data Acquisitions – Data Acquisition Proposal Instructions". See http://web.blm.gov/data_mgt/dmp/1_3_Data_Acquisition_11-14-02_FNL.pdf.

The costs incurred to perform the Acquire Data and Metadata activity will be entered on line 14 of the Data Costs Worksheet (Appendix A).

O. Accept and Certify Data

Accepting and certifying purchased data or data acquired through field collection or a data exchange or sharing agreement is an activity performed in this segment of the data cycle. Performing quality control audits, identifying and correcting or having errors corrected and certifying the corrected data are all costs that may be incurred.

The costs incurred to perform the Accept and Certify Data activity will be entered on line 15 of the Data Costs Worksheet (Appendix A).

P. Quality Assurance/Quality Control for Acquire

Quality Assurance/Quality Control activities that must be accounted for in this segment include:

- Identifying data quality or process issues associated with data collection and acceptance
- Planning corrective measures to address identified issues
- Implementing the corrective measures
- Validating that quality and process improvements were obtained as expected

The costs incurred to perform the Quality Assurance/Quality Control for Acquire activity will be entered on line 16 of the Data Costs Worksheet (Appendix A).

Q. Costs for Maintaining and Updating Data

Data must be reviewed and updated on a regular schedule to maintain a high standard of quality. Managers need to be confident that they have the best possible data available when making decisions. Each time the data structure changes, the metadata must be updated too. Figure 5 relates the timeline for the activities in the “Update and Maintain Data” life cycle segment to the three phases of the ITIM process.

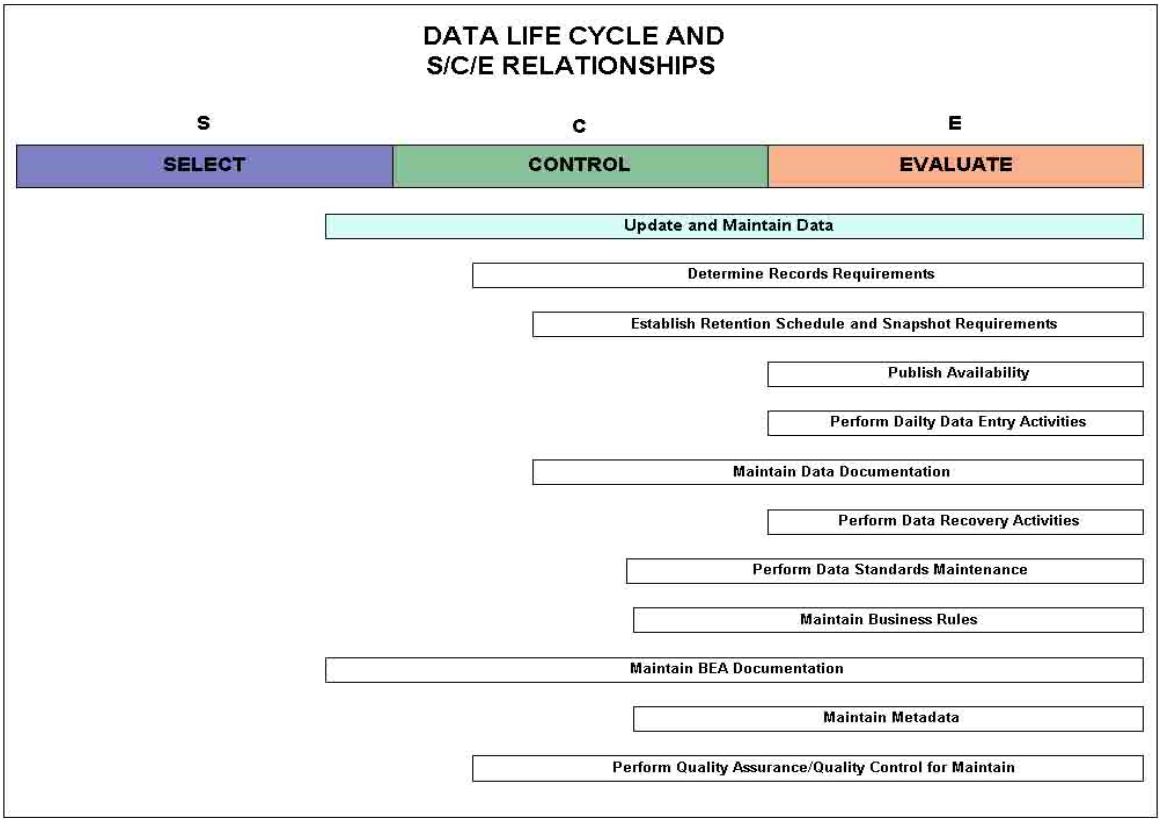


FIGURE III-5 Update and Maintain Data S/C/E/ Relationships

R. Determine Records Requirements

During this segment the records retention requirements for the type of data that will be maintained in the IT systems making up the investment must be determined following Bureau, Department, and National Archives and Records Administration guidance. Before the system is deployed, an Official Agency Record Designation Document (OARDD) that describes the types of information contained in the system and its status as Bureau records must be prepared by the system owner.

The costs incurred to perform the Determine Records Requirements activity will be entered on line 18 of the Data Costs Worksheet (Appendix A).

S. Establish Retention Schedule and Snapshot Requirements

Based on its records status, retention requirements for the data stored in the system must be established. The retention requirements include how and when the data will be archived or deleted.

The costs incurred to perform the Establish Retention Schedule and Snapshot Requirements activity will be entered on line 19 of the Data Costs Worksheet (Appendix A).

T. Publish Availability

Publishing availability of the alphanumeric data by entering its metadata in the CMR is a data cost incurred by IT investments. Adding spatial metadata to the Federal Geographic Data Committee (FGDC) Geospatial Metadata Node for geospatial data is another identified data cost.

The costs incurred to perform the Publish Availability activity will be entered on line 20 of the Data Costs Worksheet (Appendix A).

U. Perform Daily Data Entry Activities

In this segment of the data life cycle, the data in a system must be added to, updated, and corrected on a daily basis. Costs involved include key entry, in some cases double entry, electronic update, error detection, error correction, and data entry supervision. When project staff performs these activities they are project costs. Routine data entry by field personnel is not usually charged to the project.

The costs incurred to perform the Perform Daily Data Entry Activities activity will be entered on line 21 of the Data Costs Worksheet (Appendix A).

V. Maintain Data Documentation

Data documentation must be routinely maintained. Data plans, data transformation documentation, conversion instructions, and data backup and loading logs are all examples of data documentation to be maintained.

The costs incurred to perform the Maintain Data Documentation activity will be entered on line 22 of the Data Costs Worksheet (Appendix A).

W. Perform Data Recovery Activities

Performing daily backups of data and weekly or monthly transfer of data to offsite storage is a routine part of data maintenance. Maintaining the disaster recovery plan developed in the Plan for Data Needs segment and performing disaster recovery testing are additional routine tasks.

The costs incurred to perform the Maintain Data Documentation activity will be entered on line 23 of the Data Costs Worksheet (Appendix A).

X. Perform Data Standards Maintenance

Periodically assess the data standard for adequacy and usefulness. Solicit and analyze feedback from the stakeholders, to include external agencies and customers. Evaluate the change requests to determine the validity and if there is a need to modify the data standard or to make minor changes as defined in Chapter 4 of this handbook.

If a major modification to the data standard is required the modification is managed as if it is new data standard. Otherwise, the change is processed following the procedures described in Chapter 4 of this handbook.

When the revised data standard (whether it is "modified" or "minor maintenance") is accomplished, it must be posted on the Data Management website standards page. The data standards maintenance cycle is repeated starting with the periodic assessment of the revised data standard.

The costs incurred in performing the Perform Data Standards Maintenance activities are entered on line 24 of the Data Costs Worksheet (Appendix A).

Y. Maintaining Business Rules

The business rules documentation must be maintained. Associated activities include:

- Evaluating business rule usefulness by requesting and analyzing feedback from system users on established business rules.
- Evaluating the validity and scope of change requests concerning business rules.
- Evaluating the potential impact to existing data and systems caused by a proposed business rule change and initiating the "Business Rule Request" process as appropriate.
- Updating business rules by making and updating minor changes to business rules that do not involve changes to data or systems.
- Reinitiate the business rule maintenance cycle by evaluating the revised business rule.

The costs incurred to perform the Maintain Business Rules activity will be entered on line 25 of the Data Costs Worksheet (Appendix A).

Z. Maintaining Documentation

As part of maintaining data, data and business process models maintained in the Bureau Enterprise Architecture (BEA) must be regularly reviewed and updated.

The costs incurred to perform the Maintain BEA Documentation activity will be entered on line 26 of the Data Costs Worksheet (Appendix A).

1. Maintain Metadata:

Assessments of the metadata maintained in the CMR and FGDC Geospatial Metadata Node need to be made and the metadata contained in these repositories updated as appropriate.

The costs incurred to perform the Maintain Metadata activity will be entered on line 27 of the Data Costs Worksheet (Appendix A).

AA. Quality Assurance/Quality Control for Update

Quality Assurance/Quality Control Plans must be maintained just as any other data documentation. Documentation on compliance with BLM Information Quality Guidelines must be also be maintained. See http://www.blm.gov/nhp/efoia/data_quality/guidelines.pdf for BLM information quality guidelines. This includes documenting the number, nature, and resolution of

any complaints concerning the quality of any data and information the Bureau publishes. These statistics must be maintained for compilation into an annual report to the Department.

Each year the data contained in systems will be evaluated as part of the national data quality assessment. This assessment will be used as a catalyst to initiate activities in the "Evaluate Data" segment of the data lifecycle.

Occasional program level data quality assessments will be performed, triggering another round of "Evaluate Data" activities.

The costs incurred to perform the Quality Assurance/Quality Control for Update activity will be entered on line 28 of the Data Costs Worksheet (Appendix A).

Evaluating Data Quality and Access to Data

The ability to share or provide quality data to our public and other agencies is an important part of the life cycle process. We need to ensure that data is shared, but with controls to protect proprietary and pre-decisional data and the integrity of the data itself. Data sharing also requires complete metadata to be most useful to those who are receiving it. Figure 6 relates the timeline for the activities in the "Provide Access to Data" life cycle segment to the three phases of the ITIM process.

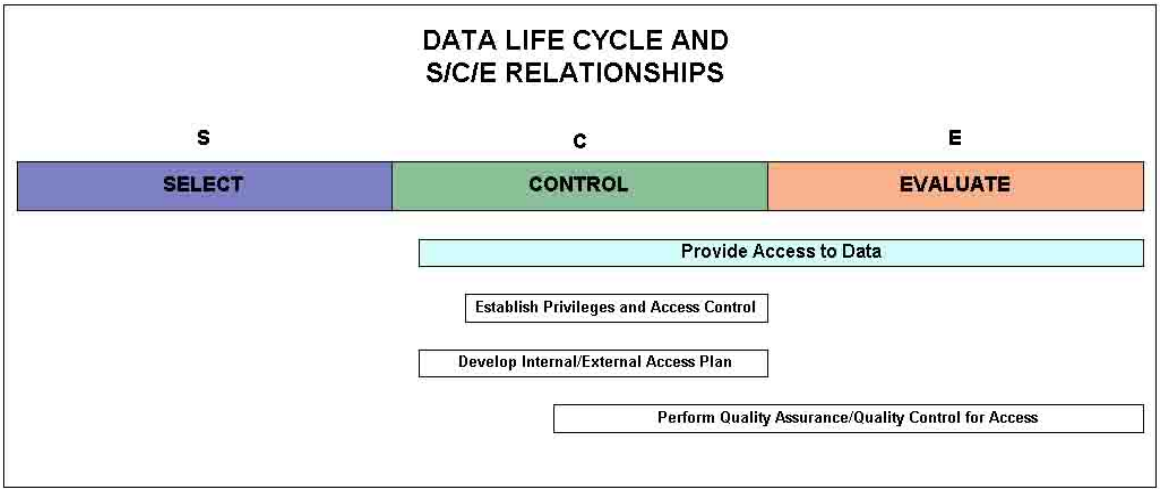


FIGURE III-6 Provide Access to Data S/C/E/ Relationships

A. Establishing Privileges and Access Controls

In this segment, data related activities include reviewing user access policy and guidance and establishing user roles based on that guidance and user requirements analysis.

The costs incurred to perform the Establish Privileges and Access Control activity will be entered on line 30 of the Data Costs Worksheet (Appendix A).

B. Developing Internal/External Access Plan

Developing an access plan for the data contained in a system is another core data life cycle activity. To perform this activity, access guidance must be written and the access plan written. Associated costs include researching and writing the report, reviewing and editing the report, and supervising the access plan development activity.

The costs incurred to perform the Develop Internal/External Access Plan activity will be entered on line 31 of the Data Costs Worksheet (Appendix A).

C. Identifying and Documenting Access Controls

Quality Assurance/Quality Control activities that must be accounted for in this segment include:

- Identifying data security or process issues associated with providing secure access to the data.
- Planning corrective measures to address identified issues.
- Implementing the corrective measures.
- Validating that expected quality and process improvements were obtained as expected.

The costs incurred to perform the Quality Assurance/Quality Control for Access activity will be entered on line 32 of the Data Costs Worksheet (Appendix A).

D. Evaluating the Relevancy of the Data

It is advisable to periodically evaluate whether data remains useful, and to use that evaluation to identify any improvements or course corrections in management procedures that would make the data more useful.

Questions that need to be addressed are: How much is the data used, and have the programs supplemented it with additional data sets (or stretched data definitions to fit their needs)? Does continued use, without fixes, increase risk to a BLM program?

Evaluation of such data issues can be scheduled into parallel tasks to "evaluate" business processes and supporting software applications. Figure 7 relates the timeline for the activities in the “Evaluate Data” life cycle segment to the three phases of the ITIM process.

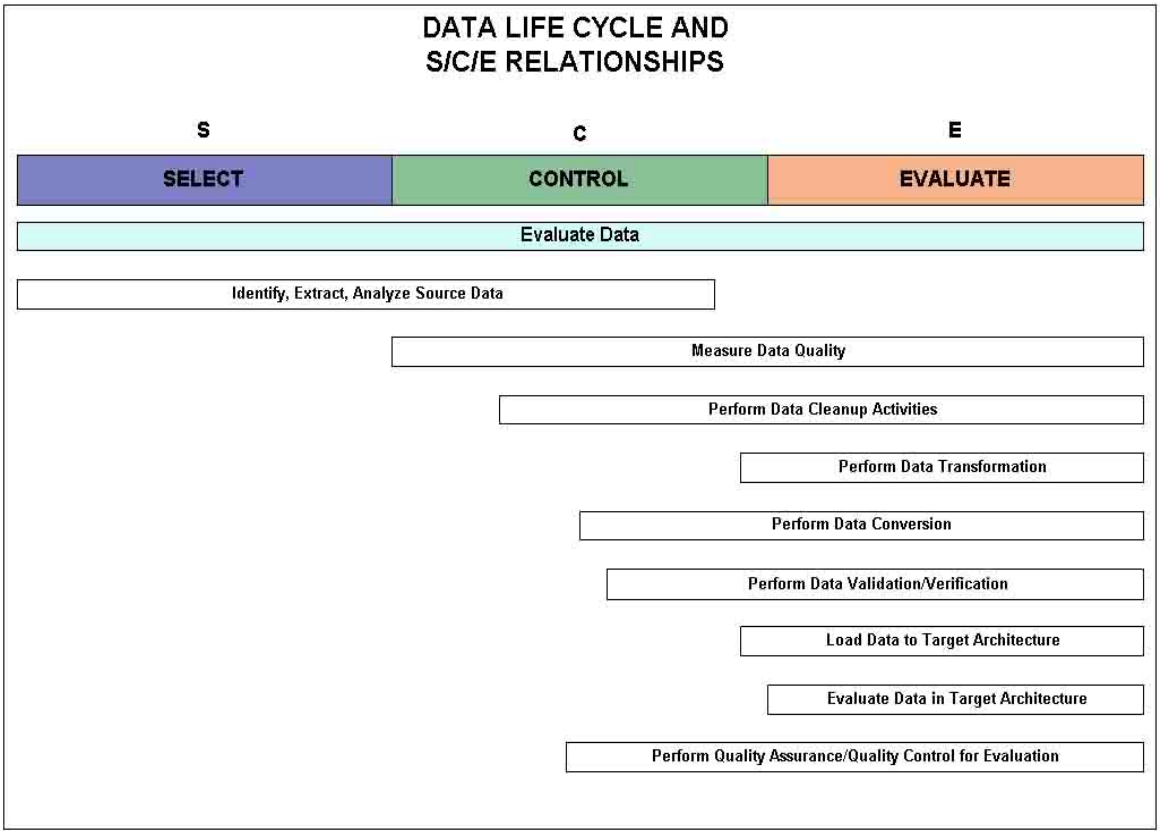


FIGURE III-7 Evaluate Data S/C/E/ Relationships

E. Evaluating Source Data

In this first activity of the Evaluate Data segment of the data life cycle, source data is located and the quality measures to be applied are determined through consultation with subject matter experts and review of existing documentation.

In the second step identified data sets are extracted from their resident databases and then analyzed against the previously identified quality measurement criteria.

The costs incurred to perform the Identify, Extract, Analyze Source Data activity will be entered on line 34 of the Data Costs Worksheet (Appendix A).

F. Measuring Data Quality

Once data has been analyzed, its quality relative to the expected quality characteristics can be compiled into appropriate statistics, compared to other datasets and reported as necessary.

The costs incurred to perform the Measure Data Quality activity will be entered on line 35 of the Data Costs Worksheet (Appendix A).

G. Data Cleanup Activities

When erroneous data values are detected during the life cycle of the data, cleanup must be performed to improve the quality of the data. Cleanup of the data can either be performed in existing databases or during transfer of the data from one system to another.

The costs incurred to Perform Data Cleanup Activities will be entered on line 36 of the Data Costs Worksheet (Appendix A).

H. Data Transformations

Data transformation activities are those necessary to define and apply algorithms to change data from one form or domain value to a standard form or set of domain values. Data transformation usually occurs on a reoccurring basis, often daily. Copying data from an online transaction processing database, transforming the data, and loading it to a reporting database is a common example.

The costs incurred to Perform Data Transformation activities will be entered on line 37 of the Data Costs Worksheet (Appendix A).

I. Data Conversions

Data conversion activities include all those necessary to physically move data from one physical environment to another. Changing and reordering data values may be necessary to accomplish this. Any accounting for costs related to this activity should allow for the possibility that several iterations of the conversion maybe necessary before the data will be successfully loaded into the new physical environment.

The costs incurred to Perform Data Conversion activities will be entered on line 38 of the Data Costs Worksheet (Appendix A).

J. Data Validation/Verification

This group of activities includes all those necessary to compare prior and post conversion or transformation data values to expected values. Validation and verification assures that the converted or transformed data meets an expected level of quality for both correctness and completeness.

The costs incurred to Perform Data Validation/Verification activities will be entered on line 39 of the Data Costs Worksheet (Appendix A).

K. Loading Data to Target Architecture

Once data is transformed or converted, the activities that will prepare the data and load it into the target data architecture must be performed.

The costs incurred to perform the Load Data to Target Architecture activities will be entered on line 40 of the Data Costs Worksheet (Appendix A).

L. Evaluating Data in Target Architecture

Completing loading of data into the target architecture triggers a new iteration of "Evaluate Data" activities. Activities involved in target architecture evaluation include examining log and audit files, spot checking of data values, data error correction and cross validation of the source and targeted databases.

The costs incurred to perform the Evaluate Data in Target Architecture activities will be entered on line 41 of the Data Costs Worksheet (Appendix A).

M. Evaluating Quality Assurance/ Quality Control

Quality assurance quality control activities in the Evaluate Data segment are similar to those in other segments of the data lifecycle. They include Identifying data quality or process issues associated with data validation and correction, planning corrective measures to address identified issues, Implementing the corrective measures, and validating that expected quality and process improvements were obtained as expected.

The costs incurred to perform the Quality Assurance/ Quality Control for Evaluate activities will be entered on line 42 of the Data Costs Worksheet (Appendix A).

N. Identifying Data for Archiving

Data should be disposed of in accordance with a written policy that conforms to the requirements of the National Archives and Records Administration (NARA). Correct and prompt disposal of outdated information may reduce the Bureau's risk in some FOIA requests or legal actions, by demonstrating strict conformance to written policy and eliminating incorrect, outdated, or irrelevant information from the record.

Organizing and identifying data to be archived should be directed by the project manager lead, in consultation with Data Administrators, the records administrator, and the GIS specialist. The local system administrator should carry out archiving of digital data. Figure 8 relates the timeline for the activities in the "Archive or Dispose of Data" life cycle segment to the three phases of the ITIM process.

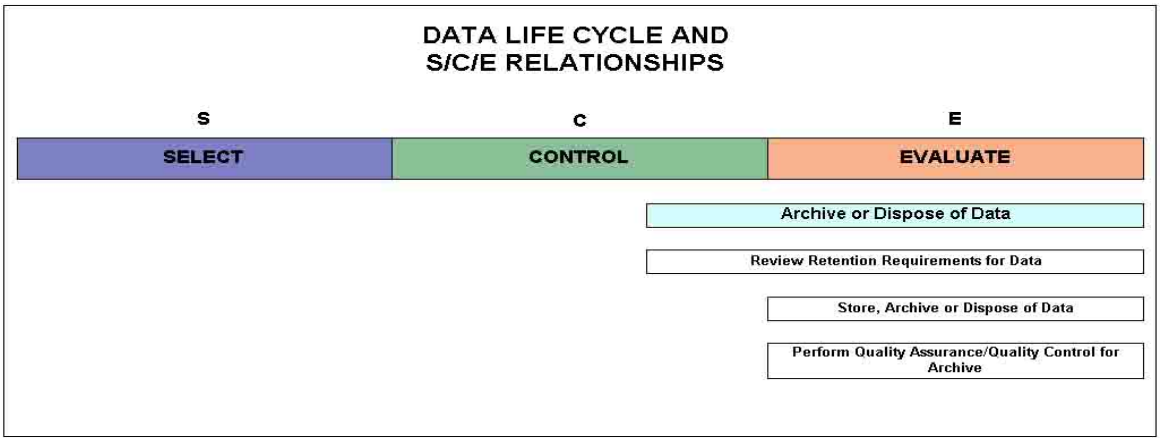


FIGURE III-8 Archive and Dispose of Data S/C/E/ Relationships

O. Review Retention Requirements for Data

The BLM Manual 1220, Appendix 2, GRS/BLM Combined Records Schedules need to be reviewed on a regular basis to assure that all information in a computer system that is classified as a record is retained or disposed of appropriately.

The costs incurred to perform the Review Retention Requirements for Data activities will be entered on line 44 of the Data Costs Worksheet (Appendix A).

P. Archiving, Storage or Disposal of Data

Depending on its status in the General Records Schedule data may be retained in the system, archived, or disposed of properly. These activities are usually performed by a data center systems administrator and should be charged to the investment.

The costs incurred to perform the Store, Archive or Dispose of Data activities will be entered on line 45 of the Data Costs Worksheet (Appendix A).

Chapter 4: Data Management Roles and Responsibilities

A. Introduction

The Charts listed on Appendix F shows the Roles and Responsibilities for data management based for the employees of the BLM. Everyone within the BLM has responsibilities for ensuring accuracy with respect to the data they work with (either creating, updating or modifying or deleting). The explanations of the roles and responsibilities depend on what position you hold with respect to the data being used.

B. Identify Your Data Management Responsibilities

1. Locate your, and/or your staff's, role in the left column of Appendix F.
2. Note in each column to the right whether you, and/or your staff, have Lead, Support, or Responsible responsibility roles.
3. Refer to Appendix H for data management knowledge and responsibilities required of you and your staff.
4. Plan and schedule for time and activities to include these data management responsibilities.
5. Document data management responsibilities in Employee Performance Appraisal Plan (EPAP).
6. Work with your human resources staff to add data management responsibilities to position descriptions.

C. Acquire Data Management Knowledge and Skills

1. Use Appendix G to locate your role (or your staff's role) in the third column of the table.
2. Use columns 1 and 2 of Appendix G to determine the data management knowledge, skills, abilities, and training you and your staff require. Note the training needed to bring you and your staff up to required knowledge level for your data management roles and responsibilities.
3. Contact your state data administrator, the NTC, and your state training lead to find and schedule participation in the appropriate training sessions.

D. Supervisors

1. Inform management of the necessity to assign data management roles and responsibilities (see Appendix D).
2. Initiate the in-state directive for designating Data Administrators (see Appendix E).
3. Allocate resources (staff, time, funding, and training) to ensure data management responsibilities are met.
4. Fill State and Center Data Administrator position.

Chapter 5: Developing Data Requirements

A. Introduction

This chapter outlines the steps involved in identifying what information is needed to support your business processes. Techniques and tools have been developed to help the program specialist, data provider, and data consumer determine the types of information needed, the reason it is needed, the business activities and processes it supports, and any limitations put on the data to provide useful information for the business employee or customer. The goal in this section is to identify and document the data entities and attributes which, when combined, provided information. Once these data entities and their relationships to each other are documented, they are further defined and refined into standards. The standards, once established, allow to be built with edit controls and coding instructions that document exactly how the data needs to be collected and entered correctly and what edits can be placed to ensure greater data quality.

B. Use of Modeling

The analysis of business requirements and data needs are conducted according to Structured Methodologies, employing business process and data models to show the flow of individual business events and the data entered, accessed, or updated as a result of those events.

Data Models are representations of the business functions and the data that supports them. They provide a basis for analyzing the processes and workflows associated with conducting business activities, the creation and use of data to assist in completing those activities, and the specific components (data elements) and their relationships to one another.

C. Types of Models

1. Business process models record business events and the flow of data from one organization or one work group to another.

2. Entity Relationship Diagrams (ERD) show the relationship of data elements to each other. The models can be used to move from the conceptual model of how data is used and created to a logical model showing the relationships among the data elements, to eventually, a physical model showing how the data would be arranged and stored in the database.

D. Methodology for Modeling

Modeling sessions are facilitated by data analysts who will detail the specific methodology to be used and the formats for creating the models. Business subject matter experts are the ones who provide the expertise in what the process is while the data analyst furnishes the analysis and the format for documenting the model. This Handbook highlights the steps involved in modeling at a high level only.

E. Use of Computer Assisted Software Engineering (CASE) Tools and Repositories

The BLM will strive to use automated tools to assist in the development and documentation of its business and data models. CASE tools will be used to develop the models and the definitions and metadata will be stored in the CMR maintained by the BLM. The CMR will also maintain the data standards developed by the business programs to ensure that their meaning is properly understood and entered.

F. Documenting Business Requirements

A business requirement is what the business wants from the information system. The business requirement specifies what the business needs and the high level requirements that the completed information system needs to address. Some BLM examples are:

1. "BLM needs to record and provide its field offices with information relating to a permit for the use of land as soon as the permit is granted."

2. "BLM needs to facilitate customer service by ensuring the customer information and product requested is recorded at the time the order is placed and be able to track the progress of that order."

3. "BLM will monitor the population of the sage grouse in a given area over time (e.g., several years)."

4. "BLM will evaluate the success of our weed eradication activities on a given tract of land for an entire field season and compare it with previous years' efforts."

G. Sources of Business Requirements

1. Legislative Language: Congress often affects the work that we do and the data we need to collect. It also can affect what data can be collected and possible mandated reporting requirements. Congress may also, through its oversight role, may determine what data needs to be kept and for how long.

2. Interviews with Customers or Employees: When actively seeking to understand our data needs, interviews of those currently collecting and using the data or completing the business processes can be invaluable. They can tell you what they do and why they do it.

3. Facilitated Requirements Sessions: In the interest of time, you can get many of those "interviewees" in a room together. This often brings up differences between offices and between individual users in a forum where they can compare notes and determine why those differences exist. These are meetings specifically set up to not only analyze business processes but to get them down on paper for all to have a common reference.

4. Data and Business Modeling Sessions: These sessions are directed by a data analyst who is used to model the flow of the business (Process Modeling) and the data requirements and relationships that assist the business (Data Models). Modeling provides a way to have the subject matter experts (SMEs) explain their work and the data needed to support it. Modeling techniques are discussed in greater detail below.

H. Business Rules

Business Rules are the conventions and methods of operating that establish the limits on the business. While data modeling can show the relationships of the data entities and attributes, business rules present the procedural or legal constraints that the business operates under. Because of the nature of government, business rules tend to be more formalized and can be gleaned from regulations, Manuals, and Standard Operating Procedures to ensure uniformity of practice.

I. Examples of Business Rules

The following are examples of business rules to guide the conduct of BLM inspections using volunteers who take patrols (routes) to monitor activities on BLM administered lands. The following business rules are documented based on BLM's procedures:

1. Only U.S. citizens who are over the age of 17 can be used as volunteers on patrols.

2. Volunteers must file a report which patrols they took and where they went.

3. A volunteer can only inspect a particular patrol once during a day.

4. Patrols must be monitored by BLM personnel.

J. Sources of Business Rules

Typically, business rules show up as part of the regulations or guidance to the programs (e.g., Code of Federal Regulations, BLM Manuals, Handbooks, Instruction Memoranda (IMs), and other guidance material). Some rules may not be documented, and may exist only in the heads of senior managers or seasoned program specialists. Once the data modeling is completed and the rules documented, they can help in developing data standards for the data to be captured and maintained.

K. Modeling Business Processes

A model is a representation of something in the real world. A Business Process Model represents the business events that are conducted to achieve a result. A Business Process Model identifies what is being done, what information is needed (if any), what information is created or modified, and what is passed on to the next activity as part of the process. The Data Model represents the data needed to support those activities or events identified in the Process Model.

L. Data Modeling Terms

1. Entities

   Entities are the persons, places, events, concepts, or things the organization is concerned about. They provide the data objects that are recorded and tracked by the organization. Many entities may already be modeled and incorporated into the BLM's data subject areas. Therefore, it is recommended to work with a BLM data architect on which of the data subject areas can be incorporated into a logical data model.

2. Entity Types

Entities can be of different types associative, attributive, reference, as indicated below:

a. A Standard Entity is a person, place, event, concept, or thing that is not dependent on the existence of another entity. The convention is to name the Standard Entity using Singular, all Capitals, a Noun, or Noun Phrase. Examples include the terms “ORDER” or “PROJECT”.

b. An Attributive Entity is an entity that is dependent on the existence of one other entity (a Parent) and resolves when an attribute can have many values. The standard naming convention is: “Parent Entity Name” + Noun or Noun. For example PROJECT PHASE.

c. An Associative Entity is an entity that is dependent on existence of two entities. The naming convention links the two parent Entity Names. The order depends on a name that makes the most sense. For example, an associative entity between ORDER & ITEM = ORDER ITEM. If attempting to develop an association between FACILITY & ANIMAL; the convention would be modified depending on the nature of the association. if it is more about a specific animal then it would be FACILITY ANIMAL; if it is more about the facility, then ANIMAL FACILITY. Note that there would be an exception to this convention if business users already have a different name appropriate to describe the associative entity type.

d. Reference or Domain Entity (AKA Look-up table). This type of entity represents a list of values or domain used as a reference table. An example would be the two character State abbreviations or the Postal ZIP Code. Reference entities are typically already developed for some other application. The naming convention is to use the Attribute name in the Reference list along with word REFERENCE. Examples are: CUSTOMER TYPE REFERENCE, STATE POSTAL CODE REFERENCE.

e. Super and Sub Type Entities. When an entity represents all classes (supertype) or a subset of all classes (subtype). The naming convention for the supertype is a noun phrase, the subtype includes the supertype’s name as the last word in its name and there must be more than one subtype defined. Example: Supertype is PLAN, Subtype Example: MANAGEMENT PLAN or PROJECT PLAN.

3. Relationships

A relationship is the line between two entities that denotes how they are related to each other. Relationships can be of three types:

a. One Entity related to Many Entities (or conversely Many to One)

b. One Entity related to One Entity

c. Many Entities related to Many Entities

For a logical model to provide an automated solution, the final model cannot contain any Many to Many relationships between two entities. Many to Many relationships between Entities would be resolved in the data modeling by "Normalizing" the model through using an associative entity. From the parent to the child, determine if the relationship is mandatory (0 or 1) and the cardinality (maximum of 1 or many). Possible values (0:1, 0:M, 1:M). From the child to the parent, determine if the relationship is mandatory (0 or 1) and the cardinality (maximum of 1). Possible values (0:1, 1:1).

4. Naming Relationships

Like Entities, Relationships have certain naming conventions:

a. The Name from the parent to the child entity type is an active verb phrase. This is the only relationship that is included on the data model diagram. Example is "A Customer *purchases* many Products"

b. The Name from the child to the parent is implied and is not included on the logical model diagram. It is stated as a passive verb phrase. For example, "A Product *is purchased by* a Customer)

c. When an entity has a relationship with itself, it is either single recursive (1-to-many relationship with itself) or double recursive (a many to many relationship with itself).

d. A single recursive relationship follows the standard naming conventions. An Example is "An Organization owns One or Many Organizations"

e. A single recursive relationship follows the standard naming conventions. An Example is "An Organization owns One or Many Organizations"

1) An example is "An Organization owns One or Many Organizations"

2) The many-to-many relationship needs to be resolved for the double recursive by including a new associative entity. An example is: "A Project connects to One or Many Related Projects" or "A Project is connected to One or Many Projects".

5. Attributes

An attribute is any detail that serves to qualify, identify, classify, or quantify a particular entity. Like Entities and Relationships, certain conventions apply to Attributes:

The name of an attribute consists of up to four parts:

a. Object class (always required): the entity type name or other prime word;

b. Property Term (usually required): a term specific to the attribute that helps define the content;

c. Qualifier Terms (optional): one or more adjectives that make a name unique to the context;

d. Representative Term (Rep. Term, always required): one of a controlled set of words that represents the domain of the attribute. A list of valid values follows.

The format for the name is Object + Property + Rep Term. A Qualifier can appear between Object & Property or Property & Representative.
Examples: Person First Name (object+qualifier+repterm)
Inventory Aircraft Flight Date (object+qualifier+property+repterm)

6. Representative Term (aka Class Word)

Representative terms are used as the part (word) of an attribute name to denote the class of attributes. They determine, among other things, how the attribute can be computed or represented. For instance, an attribute designating "Amount" would be represented in U.S Currency with two digits to the right of the decimal allowed. Attributes governing name might specify "Last Name, First Name, spelled out "Middle Initial" one letter". The Representative Terms are determined for BLM by the Department of the Interior. Changes to these terms will be published on the BLM Data Management website. They are being presented here as an example of the types of terms that would be considered Representative Terms or Class Words.

Name	Definition
Amount	Used for Currency only; a monetary amount. Its domain is decimal, with two positions to the right of (after) the decimal point.
Code	An attribute which is represented by coded information. A code is made up of alphanumeric characters, and would need to have an associated description for each code value.
Date	Calendar date. The format standard is CCYYMMDD (century, year, month, day)
Identifier	This is a "designed" key for an entity. (An artificial, system-assigned number which identifies a unique occurrence of an entity type.)
Measurement	The numeric value associated with a gauged or scaled extent, capacity, volume, weight, dimension, or frequency. Use when a unit of measurement (cubic centimeter, linear foot, pounds, grams) is clearly specified or identified.
Name	A label or name of a specific person, place, or thing. In some cases, if a name can be split into parts, with distinct meanings, create an attribute for each part of a name. (Person First Name, Person Middle Name, Person Last Name, Person Suffix Name). Eye Color Name would be appropriate rather than Eye Color Text (refer to Examples for Text vs. Name). An attribute such as River Name could contain "Mississippi" whereas Physical Feature Name could contain "Mount Rainer". Examples for Text vs. Name: Horse Color Name: black Horse Color Text: a light black with small speckles of white
Number	An alphanumeric non-system identifier, such as a Vehicle Identification Number. Also for non-computational numeric data, such Applicant House Address Number.
Quantity	Numeric, used for non-monetary attributes, such as a count. (Adopted Horses Requested Quantity, Estimated Person Attending Quantity)
Rate	Numeric data that represents a percentage or ratio. The format would be in decimal format, not in percentage or ratio format. For example, it would be 'stored as' 0.154 which represents 15.4%.
Time	Time of day. The format standard is HHMMSS (24 hour clock).
Text	Data having an unstructured content; a free-form explanation describing a person, thing, or event that cannot be divided into categories or groups.
Year	Calendar year unless fiscal is specified. Its format is CCYY (century and year).

8. Attribute Denoting Units of Measure

For attributes that are for a specific type of unit of measurements (UOM), include the type of measurement as a Qualifier in the name. For example: Area Acre Measurement or Fahrenheit Degree Measurement. The following are examples of measurements:

Cubic centimeter, foot, meter.	Degree (as in temperature or angle)
Linear foot, mile, meter	Square foot, meter, centimeter, inch.
Pound, gram	

If the UOM type can vary for a given attribute value, then two attributes are required.

9. Reference Entity (Lookup Tables)

Some entities already have been developed by other organizations and these entities can be referenced to a Lookup Table that may be a standard reference table. For instance, a country code or State Code could already have been produced by another organization (e.g., the U.S. Postal Service, the United Nations). The following is the recommended naming convention for Entities that list the valid set of values for the domain of an attribute. "Code" attributes generally have a Reference Entity.

Entity Name	"ATTRIBUTE NAME" REFERENCE	IOC USA STATE REFERENCE
Attribute Names	The reference entity usually has four attributes. The primary identifier for the table would be "Attribute with Domain" Code; "Attribute with Domain" Name or Text; Code Valid Date (The date the code is valid) Code Invalid Date (The date the code becomes or is invalid). The entity may have more attributes if they are required to fully define the domain.	IOC USA State Code USA State Name Code Valid Date Code Invalid Date Structure Type Code (fence) Structure Material Code (wood)
Valid Values	If an attribute's value is blank (" "), there can be no meaning associated with blank, other than it has no value. (For example, Blank cannot mean "yes" or a default value.)	

There may be several reference entities required for the logical model which will generally cause the data model diagram to be unreadable. Either include only project specific Reference entity in the logical data model, or create a Reference data model view which contains Reference entities.

M. Data Naming Conventions

1. The Standard Name is always singular and in title case, with a space between each word.

2. There is not a maximum length for the name.

3. Avoid the use of abbreviations, acronyms, special characters, prepositions, articles, and conjunctions unless it is common practice to do so.

4. BLM has a list of standard abbreviations or acronyms that are acceptable at the following website: niop3app1.corp.blm.gov/datashopper/glossary.asp

5. When using qualifiers, be consistent (use the same word for similar meanings) and use the appropriate adjective (verb tense) for the Qualifier. If the attribute values come from an outside source use that source in the name.

N. Additional Data Types

1. Derived Data:

Derived data is a value that is determined from relationships or calculations. Derived data elements would not be included on the logical model if it can be calculated from the value of one or more attributes or occurrences of an Entity attribute. Derived data can be collected as a business rule (e.g., a royalty amount is calculated as 12.5% of the gross tonnage of a mineral commodity). It can also be included in the physical design for the database. For example, the relationship between ANIMAL & ADOPTED ANIMAL could be derived from the date of the event of an adoption. Total Expense Amount can be calculated by adding Event Expense Amount for each relevant entity occurrence. If Birth Date is an attribute, an Age attribute would be derived from today's date and would not be included as an entry.

2. Primary Keys

All entities need to have an attribute, or set of attributes, and foreign keys that make each occurrence of the entity unique (see Normalization). The Primary Key is designed to identify an individual occurrence of that entity. A primary key value is never 'blank' or null. If the primary key is a linking of several attributes no part of the primary key can be blank. If part of the primary key is blank or null, use a designed primary key. Examples of Primary Keys include the Nine digit Zip Code for an address, State Abbreviation Code, and Name ID.

O. Normalization

Normalization is the process of refining and regrouping attributes in entities according to the normal forms. In order for it to work, a finished logical data model needs to be in Third Normal Form. Normal Form is a condition of an entity relative to satisfaction of a set of normalization theory constraints on its attribution.

First Normal Form (1NF)	A data object is in 1NF if, and only if, all underlying simple domains contain atomic values only. Each attribute of an entity must have exactly one value for each occurrence of the entity, with no lists, repeated occurrences, nor internal structures (the value of an attribute cannot be split into parts).	The attribute Payment Amount cannot have more than 1 value for a given entity occurrence. The attribute Payroll Account Number cannot be made up of Department Number & General Ledger Number.

Second Normal Form (2NF)	A data object is in 2NF if and only if it is in 1NF and every non-key attribute is fully dependent on the primary key.	FACILITY (entity) Facility Name (PK) Facility Type Name Facility Built Date Current Date Current Animals Held Qty (The Quantity is dependent on Date & Name, not just Name, so a 2nd entity is needed)
Third Normal Form (3NF)	A data object is in 3NF if, and only if, it is in 2NF and every attribute (that is not a part of the primary key) is not dependent on the primary key. Two or more attributes are mutually independent if none of them is dependent on any combination of the others.	Employee Employee Name Employee Social Security Number Employee Department Name Employee Unit Name Employee Birth Date (Unit is dependent on Department, so Department and Unit belong in separate entity and there would be a relationship from Dept/Unit to Employee)

P. Physical Data Models

A Physical Data Model is developed to show how the Data Tables and Rows will be structured in a database. While typically developed by the Database Designer, Physical Models contain certain Naming Conventions adopted by the BLM. These Conventions have been developed for documenting the Physical Data Model in the CMR.

Q. Suggested Physical Attribute Naming Conventions for Physical Data Models

The following are suggestions for physical attribute names (also called columns or fields). The length of the physical name is usually limited by the database management system. More information on how to document physical items can be found in Instruction Memorandum (IM) 2004-60 and the DOI Departmental Manual Data Standardization Procedures. For further assistance, contact the Data Management Group.

Standard Column Name	Use standard abbreviations and acronyms; a list is available at: http://niop3app1.corp.blm.gov/datashopper/glossary.asp Always include the representative term as the last word (abbreviations below). Additional representative terms are available for physical names (Indicator, Object & DateTime). Separate each word or abbreviation with an underscore, or what is appropriate for the database management system.	Examples: Inventory Aircraft Flight Date: IVTY_ARCRT_FLGT_DT Herd Management Area Name = HMA_NM
Derived Columns	In the logical model, derived attributes are avoided. In the physical model, results of calculations and formulas can be included.	Examples: TTL_EXP_AMT TTL_ADOPTED_HORSE_QTY

	Try to include the word Calculated, Sum, or Total in the name (or its abbreviation). Data can be derived from an optional relationship, and can result in a column which indicates the value of Yes or No.	Example: ANIMAL _PRVSLY _ADOPTED_IND (Designates Animal Previously Adopted)

1. Physical Attribute Representative Terms and their Abbreviations

Rep. Term	Abbreviation	Rep. Term	Abbreviation		
Amount	AM	Measurement	MEAS	Rate	RT
Code	CD	Name	NM	Time	TM
Date	DT	Number	NR	Text	TX
Identifier	ID	Quantity	QY	Year	YR

2. Representative Terms for Physical Model Only:

Rep. Term	Abbreviation	
Date Time	DT_TM	For system generated date time stamps
Indicator	IND	For columns that have a domain or Yes or No
Object	OBJ	The content is a file name, URL, etc.

R. Steps in Developing Data Requirements

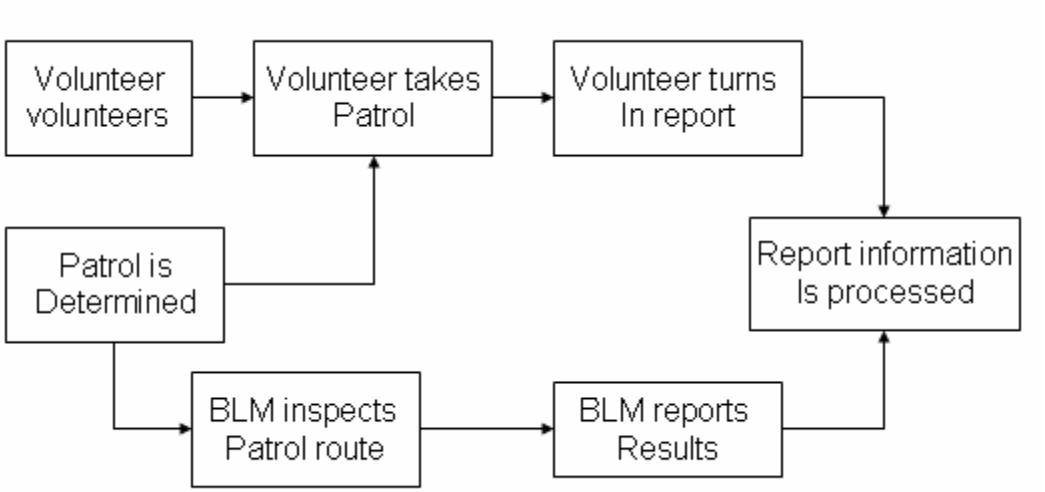
1. Modeling Business Processes

A Business Process Model represents the business events that are conducted to achieve a result. A Business Process Model identifies what is being done, what information is needed (if any), what information is created or modified, and what is passed on to the next activity as part of the process. The Data Model represents the data needed to support those activities or events identified in the Process Model.

2. Examples of Modeling Business Processes

The easiest way to understand how modeling works is to take an example. Let's model the business process the BLM employs in using volunteers to conduct inspections. A database is being developed to track information on volunteer activity. The remainder of this example will trace the development of business processes and data models to create a dataset.

A high level business process flow might look like this:



The blocks above represent activities directly associated with the work. From this model, we can identify what data is needed to complete each block. We have the business flow, now we need the data entities.

a. Describing Entities

An entity is a person, place, thing, or event about which we need information (e.g., VOLUNTEER, PATROL) or to the items placed on a form (e.g., Individual Volunteer Services Agreement). There are four major types of entities:

1. Standard Entity – (a.k.a. Fundamental Entity) - a person, place, or thing (e.g., VOLUNTEER, PATROL)

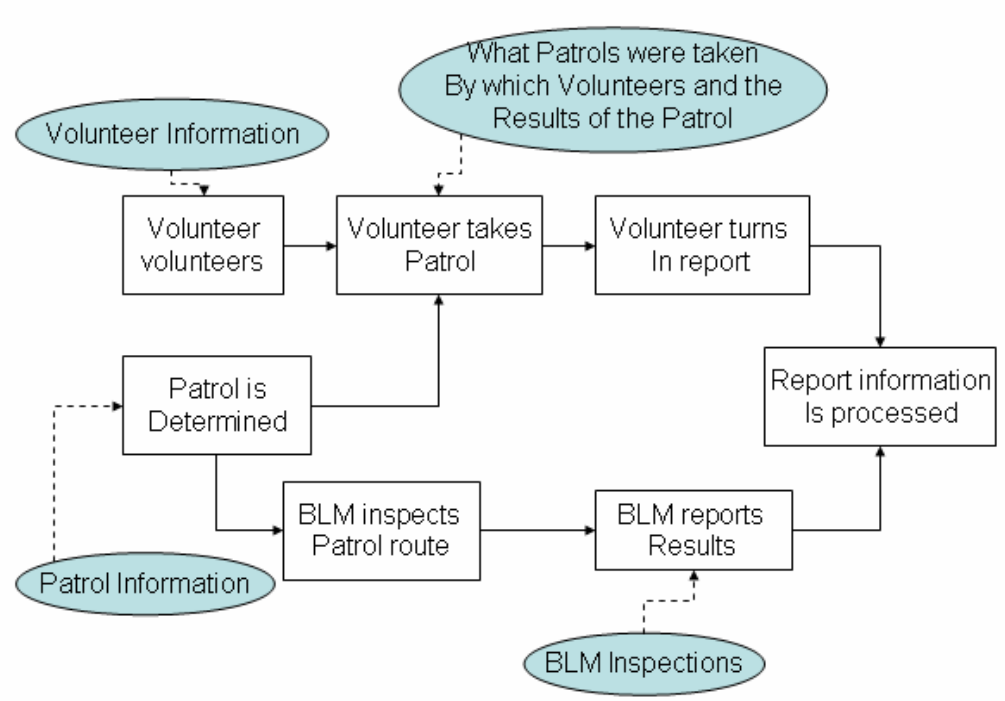
2. Associative Entity – (a.k.a. Join or Intersect Entity) - this entity depends on two or more entities and essentially ties them together (e.g., The Volunteer information entity has an identifier that identifies that volunteer uniquely.) The Patrol information entity has an identifier that identifies that patrol uniquely. Taking the Volunteer Identifier and the Patrol Identifier along with the data and time and results of a particular inspection made by the volunteer is placed in a third entity. This “associates” or “joins” the volunteer entity with the patrol entity.

3. Attributive Entity – (can be thought of as a sub-entity) - this entity is dependent on another entity (e.g., The PATROL BLM INSPECTED entity is a sub-entity to the PATROL entity). It depends on the patrol being already defined and uses the patrol identifier to tie it back to the PATROL entity. If the patrol inspected is not in the PATROL entity, the inspection is not valid.

4. Reference Entity (a.k.a. Domain or Lookup Entity) – A reference entity represents a list of values and possibly definitions for those values. The entity is used to set the domain (valid values) for a data element in another entity. The other entity references the information in the reference entity when needed. (e.g., ZIP CODE REFERENCE holds zip codes and the associated city and state it represents.) When an address is entered

into the VOLUNTEER entity, the zip code entered references the city and state in the ZIP CODE REFERENCE ENTITY. Another reference entity is the PATROL TYPE REFERENCE. It holds the patrol type and the definition for that type. (The PATROL entity has a patrol type code that references this definition when needed.)

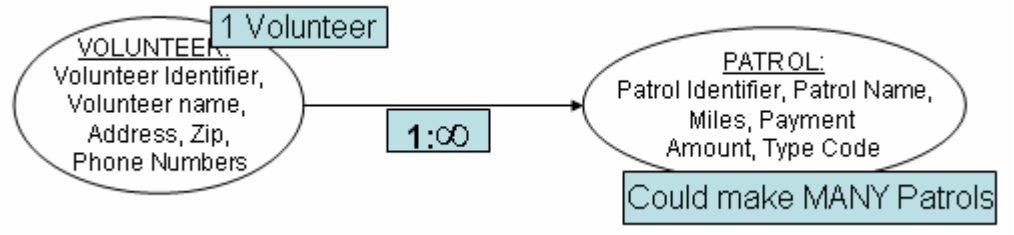
In our example, the entities can be determined by looking at your business process. What data will we need to complete these tasks?



S. Modeling the Relationships

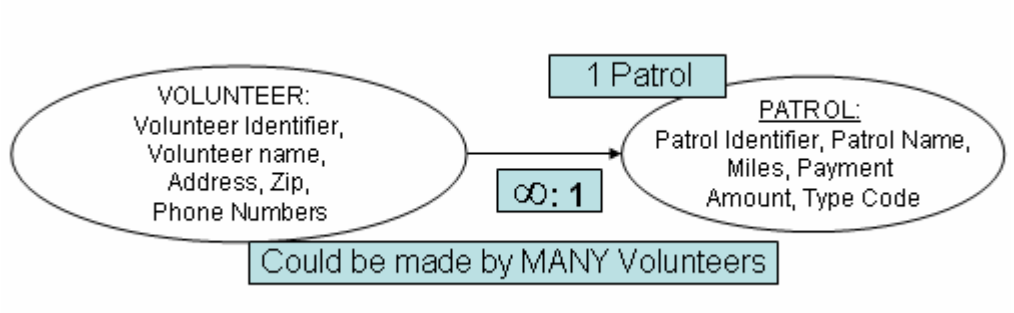
The VOLUNTEER entity lists all the volunteer information. PATROL lists all the routes that the volunteers take to check on things for BLM. The primary key for VOLUNTEER is the volunteer number. The primary key for the PATROL entity is the unique identifier assigned to the patrol.

To figure out the relationship between the two entities, take one volunteer and ask this question: "If you have one volunteer, how many patrols might the volunteer have taken?" The answer could be zero or it could be many. So the relationship going from VOLUNTEER to PATROL is defined as one-to-many.

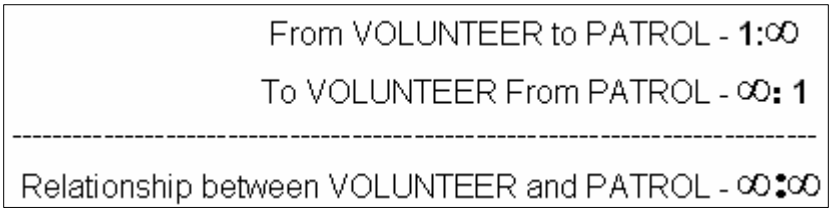


(Note: Often the one-to-many relationship is depicted as 1:∞ in a data model (e.g., schema or graphic).

Now, go the other way. If you have one patrol, how many volunteers might have taken that patrol? Again, it's many. So when you go from PATROL to VOLUNTEER, the relationship is one-to-many.



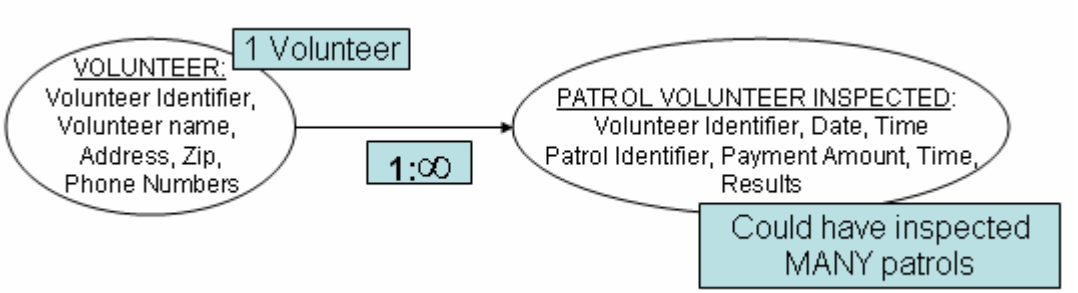
Since it is one-to-many from VOLUNTEER to PATROL and one-to-many from PATROL to VOLUNTEER, the relationship for the entity is many-to-many.



What do we need then to tie a specific volunteer to a specific patrol? We need an Associative Entity.

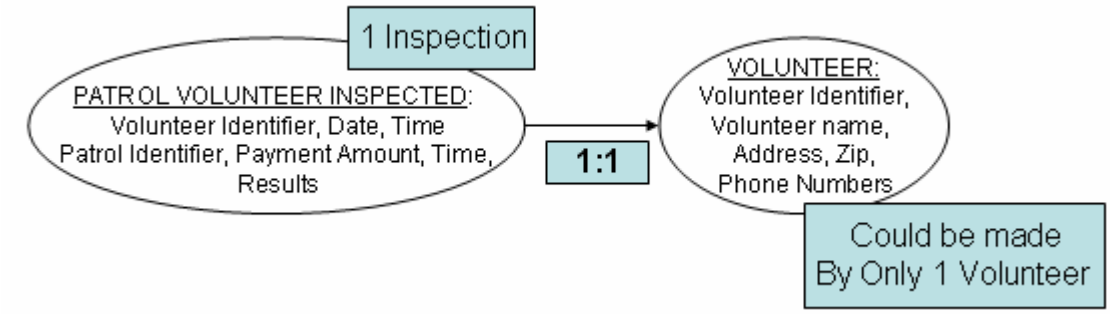
We create a new entity called PATROL VOLUNTEER INSPECTED which has two special data elements as well as others such as the date and time of the inspection. These two match the primary keys of the VOLUNTEER and PATROL entities respectively. We now can know which volunteer took which patrol.

What is the relationship between VOLUNTEER and PATROL VOLUNTEER INSPECTED?
If you have one volunteer identifier value from the VOLUNTEER entity, how many records might you find in the PATROL VOLUNTEER INSPECTED entity with that volunteer number? As it turns out, you could have many.



1.

If you have one instance in the PATROL VOLUNTEER INSPECTED entity where the data element holding a value of a volunteer identifier, how many records from the VOLUNTEER entity would you find with that same volunteer number? One! (Remember since it is the primary key there is only one instance in the VOLUNTEER entity with that value.)



The relationship between VOLUNTEER and PATROL VOLUNTEER INSPECTED is one to many going one way and one-to-one going the other. Taking the one with the higher value, the relationship between the entities then is considered to be one-to-many.

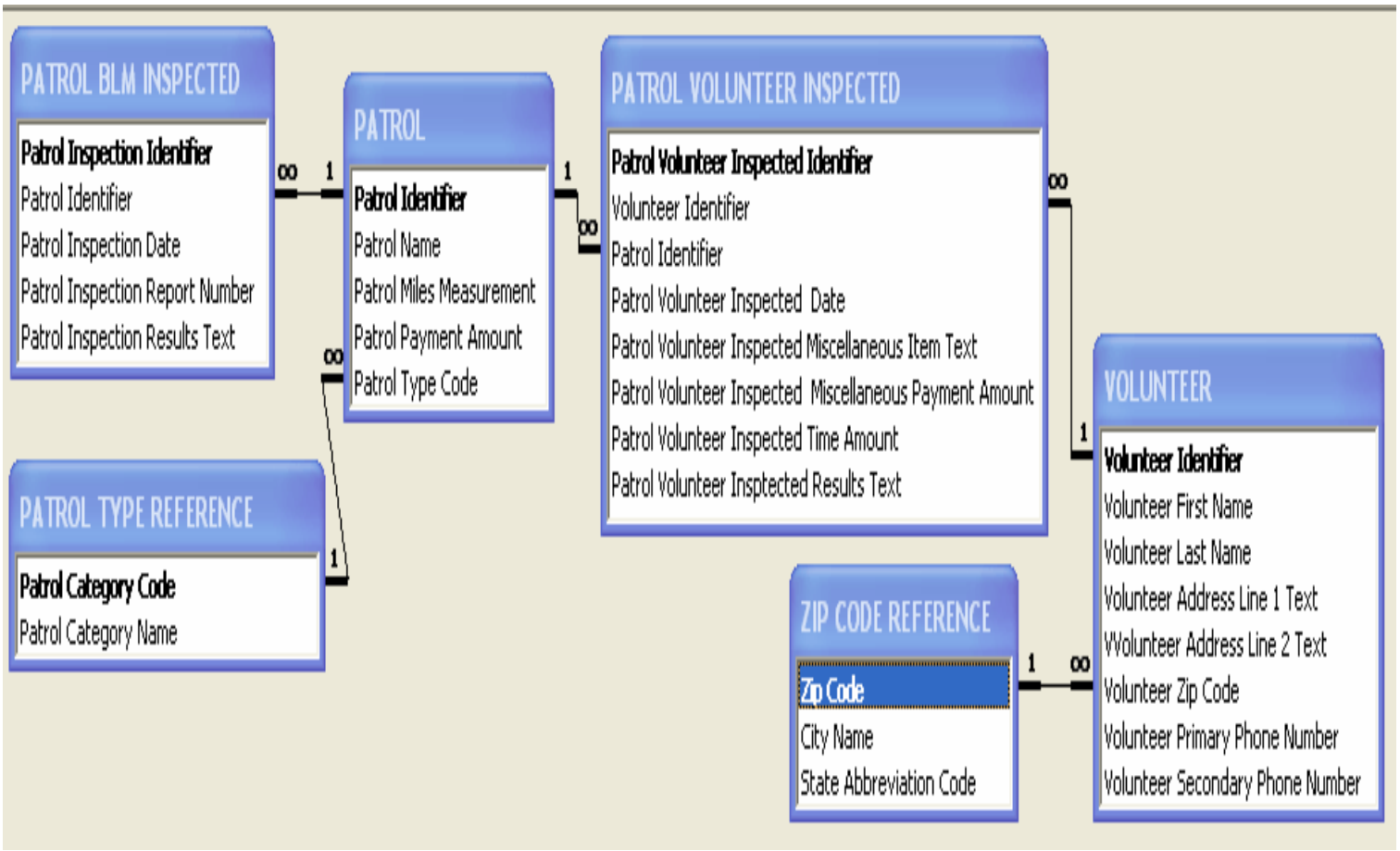
Try PATROL and PATROL VOLUNTEER INSPECTED? Did it come out the same?

From VOLUNTEER to PATROL VOLUNTEER INSPECTED - **1:∞**
To VOLUNTEER From PATROL VOLUNTEER INSPECTED - **1: 1**

Relationship between VOLUNTEER and
PATROL VOLUNTEER INSPECTED - **1:∞**

T. Example of a Data Model

Below is a Data Model (e.g., schema or graphic) that shows these relationships in our volunteer dataset.



U. Review Checklist for Completed Logical Data Model

The chart below provides a handy reference in conducting a data modeling exercise. It highlights the rules concerning naming conventions, relationships and normalization, attribute naming and use of reference data or derived data. It provides a useful guide when undertaking the data analysis and modeling activities as described in our example below.

Data Conventions Adhered to?	Yes	No
The logical model is in third normal form.		
Entities - Existing entities from BLM data subject areas were used where appropriate. Any changes to existing BLM entities were approved.		
- Each entity has a primary key and if there is more than one attribute in the key, each attribute is represented in the correct "order."		
- The entity names follow the standard naming convention for fundamental, associative and attributive entities.		
- Each supertype has at least two subtypes.		
- Reference entities are named appropriately.		
- All entities have at least one non-key attribute, unless it is an associative entity.		
Relationships - The relationship is named with a verb phrase from the parent to the child.		
- There are no many to many relationships between entity types.		
Attributes - Attributes names follow the standard naming conventions.		
- Each attribute name ends with a representative term.		
- All Code representative terms have their domain documented appropriately.		
- Text and Name representative terms are used correctly.		
- Measurement, Quantity and Amount representative terms are used appropriately.		
- Attribute metadata is populated according to the IM 2004-60.		
- Any derived attributes must be documented appropriately.		
- If the domain of an attribute is not included in a Reference entity, then the domain is defined in the attribute definition.		

Chapter 6: Metadata and Data Documentation

A. Metadata

The BLM's data resources are high-value business assets that must be documented and maintained like other critical business assets. Metadata allows internal and external customers to improve business and technical understanding of data and data-related processes by helping them to:

1. Find and access the data;
2. Understand data that are found;
3. Understand the reliability of data;
4. Understand the intended use of the data;
5. Know how and when the data were collected and by whom;
6. Know how and when data are maintained;
7. Understand any ways in which the data are manipulated and
8. See any warnings or disclaimers that may apply to the data.

B. Definition of Metadata

Metadata is typically defined as "data about data". A more precise definition would be that metadata is information about data, such as its definition, data type (for instance, whether it is spatial, alphanumeric, or graphic), how it was to be collected, accuracy standards, and who to contact for further information concerning the data. Metadata should be collected and maintained at the time the data is collected, created, or acquired. If metadata creation is put off until a later time, significant risks are incurred that the metadata will not be accurate or those knowledgeable about the data will no longer be available to help. A metadata record should be created in parallel with actions to acquire, modify, or quality-check data. Some metadata, such as those describing data standards, is completed prior to data acquisition.

C. Metadata Repositories

The BLM stores its Metadata in a repository that can be easily accessed by appropriate internal and external customers and, in some cases, may be more centrally located than the data itself. Metadata for national data sets and applications is captured and stored in the Corporate Metadata Repository (CMR). The BLM also maintains a node or web page for geospatial

metadata in accordance with the specifications provided by the Federal Geographic Data Committee (FGDC) as part of its implementation of Executive Order 12906.

D. State Level and Field Office Metadata Repositories

Data sets and applications that are not national are to be stored in one of two places:

(1) By State in the FGDC Node; or

(2) In a State or Center Repository

In either case, the metadata is to be accessible to those who need access, whether the BLM employees or members of the public (in accordance with information access rules and regulations). By Executive Order, Geospatial metadata is to be provided to the national geospatial metadata clearinghouse, regardless of the level at which the data is maintained.

E. Contents of Metadata Repositories

The criteria for determining what is loaded and documented in the Repository are as follows:

a. National Applications:

1. The application is used in more than one State (except Alaska Land Information System);

2. And the application portrays a business function of the BLM, excluding Information Technology (IT) infrastructure functions, i.e., Microsoft Office, Chameleon;

3. And the application is funded or monitored by the National Information Technology Investment Board;

4. And the application is in production, or the Information Technology Investment Management (ITIM) life cycle phase of “Evaluate”;

5. And the application is recorded in the Bureau of Land Management Enterprise Architecture Repository (BEAR).

b. State Applications:

1. The application has the “potential to become a national application;

2. Or, There are similar applications in more than one state;

3. Or, The application is very similar to a national application i.e., Alaska Land Information System;

4. Or, The application supports, or is an extension of, a national application;

5. And the application has the same functional area(s) of emphasis as a national application with the Bureau of Land Management Enterprise Architecture (BEA);

6. And the application is in production, or in the ITIM life cycle phase of "Evaluate";

7. And the application supports the BLM business lines;

8. And the application is recorded in the Bureau of Land Management Enterprise Architecture Repository (BEAR).

2. Responsibilities

a. Data Stewards are experts in the subject matter, and are responsible for setting the quality levels and the timeliness of metadata and for developing data standards and/or business rules that may affect the metadata.

b. Geographic Information Systems (GIS) specialists, Data Administrators, Database Developers, Application Developers, and other subject matter experts are responsible to assist Data Stewards Administrators to document technical and/or analytical processes. See the Chapter on Data Management Roles and Responsibilities for additional information on the roles of Data Administrators, data administrators, and others in the data management function.

c. The Corporate Metadata Advisory Team (CMAT) has been established to provide continuing leadership in this area.

F. Geospatial Metadata

All geospatial data must have FGDC compliant metadata which must then be submitted to the BLM Geospatial Data Clearinghouse at http://www.or.blm.gov/metaweb

1. The procedures for participating in the clearinghouse are summarized below. These procedures assume that FGDC compliant metadata has already been created. The FGDC Content Standard for Geospatial Metadata applies to the BLM and has been interpreted for BLM use. Additional information can be found at http://web.blm.gov/data_mgt/standards/tools-formats/FGDC_Template.doc

a. For Submission to Clearinghouse
States/Centers may have their own processes in place that need to be followed prior to submission to the clearinghouse. Please check with your data administrator or GIS coordinator if in doubt. An email address has been established for States/Center/Washington Office to submit metadata records. This address is: Metadata_Mail@or.blm.gov. You can also use this email address to notify the clearinghouse manager of the File Transfer Protocol location of metadata files if you have a large number of files to send or the files are unusually large.

b. Format Required
Each metadata record should be submitted in one of two formats: FGDC Parsed Text format or FGDC Encoded XML format. Text and XML files are the primary formats used

for importing the record into the national clearinghouse database. If your metadata tool is not able to provide these formats (or has another format that you would like to use), please contact the clearinghouse manager at OR/WA State Data Administrator or the BLM National Geospatial Data Clearinghouse (Metadata_Mail@or.blm.gov)

c. Updates
The Clearinghouse is updated daily so metadata records may be submitted at any time.

d. Collection tools
The tool used to collect metadata does not matter as long as it can create FGDC compliant records and export files in a usable format (see above).

e. Contents
Besides the FGDC Metadata Content Standard (www.fgdc.gov), the BLM has established some basic guidelines for completing a metadata record. Those guidelines are available at:
http://web.blm.gov/data_mgt/standards/tools-formats/FGDC_Template.doc

f. Creating data elements (user-defined fields)
Creation of data elements/user defined fields is permitted if the metadata collection tool has the capability. These types of non-standard fields should only be used for metadata management purposes. Any such fields will not show up in the clearinghouse.

g. Clearinghouse Manager
Initially, the OR State Office will manage the clearinghouse as a pilot effort. Any questions about the clearinghouse should be directed to the OR/WA State Data Administrator or the BLM National Geospatial Metadata Clearinghouse at (Metadata_Mail@or.blm.gov).

G. Instructions for specific metadata fields

The clearinghouse will work more efficiently if the following fields are entered correctly:

1. Metadata Title:
The metadata title is the key field in the clearinghouse database. Duplicate names are not allowed. The chance for duplication is reduced and the public understanding of the metadata is increased if a standard naming convention is used when naming metadata records. A metadata record name should be structured from the key topic that the metadata describes, two or three descriptive terms, and the State/region that the data set covers. Use only abbreviations that are universally known. The BLM standard abbreviations are available in the CMR. Some examples would be as follows:

Original Name	New Name
Arizona (AZ) BLM Grazing Allotments	Grazing Allotment AZ
COVERAGE ACCPBRA –Area of Critical Environmental Concern (ACEC) polygons as designated in the Bishop Resource Management Plan	Critical Environmental Concern Bishop California (CA)
COVERAGE HFIMSRA – Fire History (Point data)	Fire History Points CA
Fire History (Polygon Data)	Fire History Polygons CA
Range	Grazing Allotments CA
Soil Survey Geographic (SSURGO) database for Douglas Plateau Area; Parts of Garfield and Mesa Counties, Colorado	Soil Survey Douglas Plateau Colorado (CO)
Map – ICBEMP Area with Subbasins	Ownership Subbasins Columbia Basin
CRBSUM Prescription to Simulation Assignments (SDEIS)	Successional Model Prescriptions Columbia Basin
Statewide Wilderness Study Areas (WSA) coverage for NM	Wilderness Study Boundaries New Mexico (NM)
Boundaries, BLM District (Polygon and Lines)	Boundaries BLM District OR
Contours, 500-foot Intervals (Line)	Contours 500-foot OR
Grazing Allotments and Pastures (Polygon)	Grazing Allotments OR
Leasable Mineral Potential	Mineral Leasing Potential Lakeview OR
BLM Roads (Line)	Roads BLM OR
Rock Pits	Rock Pits Lakeview OR
1900 Vegetation (Polygon)	Vegetation 1900 OR
General Vegetation within the Lakeview Resource Area AMS/SBR Analysis Area	Vegetation Lakeview OR
Base Data | Administrative Boundary for the Grand Staircase-Escalante National Monument Boundary|BAMBP	Boundary Grand Staircase Utah

a. Contact Names
All BLM contact names should conform to the names as they appear in the Electronic mail tool email database. Those names are unique throughout the Bureau and provide consistency with that database. For non-BLM names, use full names to reduce possible duplicate names.

b. Keywords
Keywords are the primary search fields in the clearinghouse. Be sure to follow the guidance given the metadata template referenced above (FGDC_Template.doc).

c. Citation Names

Be as specific as possible with citation names. This will reduce the likelihood of duplicate names. Duplicate names introduce data integrity problems and need to be avoided.

2. Geospatial Metadata Tools

Several "free" tools, listed below, exist to assist users in collecting FGDC compliant metadata. Reviews that evaluate the pros and cons of each one can be found on the FGDC website at: http://www.fgdc.gov/metadata/metatool.html.

The tools noted here are considered geospatial tools. However, the tools can also be used for non-spatial data. If the data being documented does not have a spatial component then those parts of the FGDC format that relate to spatial aspects can be skipped.

The following instructions reference Geospatial data developed using ESRI (ArcCatalog, ArcGIS) and the Unix operating system (called AIX) developed by International Business Machines.

a. If you are using ESRIs ArcCatalog version 8.x or higher, a metadata editor is available with that software. If you are not yet using a newer version of ESRI products, then the following options are available:

1. TKME / XTME – This tool will allow metadata editing or the creation of a metadata record from scratch. It formats the major metadata headings and allows entry in a form like interface. The tool runs stand-alone either on Unix or Windows and there are no requirements of having ESRI software or spatial data present to generate a metadata record. The AIX source can be found at http://geology.usgs.gov/tools/metadata/aix.shtml. The Windows version can be found at:

   http://geology.usgs.gov/tools/metadata/all_win.exe.

2. FGDCMETA.AML – This tool is written in Arc Macro Language (AML) which must be executed from ARC/INFO. It captures many of the coverage specific elements, such as projection information, the geographic extent, and Entity and Attribute information (item listing only). It can be downloaded from http://www.isgs.uiuc.edu/nsdihome/webdocs/fgdcmeta.html. Note: Some knowledge of AML is helpful as you may want to customize the default entry fields.

3. ARCVIEW METADATA COLLECTOR V2.0 EXTENSION – This form based tool works from ArcView and collects some of the basic spatial reference information of a coverage or shape file that the user is currently working on. It resembles a "wizard" interface, walking the user sequentially through the various sections of the metadata while providing samples for reference. Templates for each section can be created and saved for re-use in subsequent metadata records. Note: Metadata created from other systems can be displayed from this tool but may not be able to be edited. It can be downloaded from: http://www.csc.noaa.gov/metadata/text/download.html.

4. At least one (COTS) software is available for metadata management and is in use in some BLM offices. This is the Spatial Metadata Management System (SMMS) from Intergraph. This tool can access data sets and retrieve certain pieces of information (much like some of the other tools) and stores the information in a Microsoft-Access database. If you have questions or concerns about the available tools, contact your State Data Administrator or the BLM National Geospatial Metadata Clearinghouse (Metadata_Mail@or.blm.gov).

H. Data Element Attributes.

Data management policies and conventions shall apply to alphanumeric and geospatial data elements used in new and re-engineered applications and data elements created as data standards whether the elements are created for national, state, or local applications. Bureau-wide standard data elements will be documented and maintained in the Corporate Metadata Repository (CMR). The CMR is the official repository for Bureau-wide standard data elements.

1. Basic Attributes of Data Elements. The table below provides guidance on the information that is required to fully attribute data elements. This list of attributes (or characteristics) is aligned with the International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) International Standard, Information Technology – Specification and Standardization of Data Elements (ISO/IEC 11179) and the Federal Geographic Data Committee (FGDC) approved Content Standard for Digital Geospatial Metadata (FGDC-STD-001-1998). The grouping of attributes in attribute categories matches those used in the ISO/IEC 11179 standard for registration of data elements. An online data dictionary describing these metadata attributes is available at http://web.blm.gov/data_mgt/support/data_element_attribute_dictionary.doc

Attribute Category	Attribute	Description
Identifying	Name	The data element name is made up of an Data Object, Data Property, and Data Representation. The name of the data element must follow the Data Element Naming Convention (see paragraph 2).
	Identifier	Unique identifier assigned to the data element by data management staff.
	Version	Unique version number assigned to the data element by data management staff.
	Synonymous Name	An alternative name for the data element that represents the same data element concept.
	Context	The application or professional discipline from which the data element originates.

Attribute Category	Attribute	Description
Definitional	Definition	A definition must be provided that: • is not circular or self defining (doesn't simply restate the words in the element name to define it). • includes references to any aliases and exceptions, as applicable. • does not contain abbreviations or acronyms unless the meaning of the abbreviation or acronym is clear from the context and generally understood. • is expressed without having to define the words used. • uses common terminology. • is stated in the singular.
Relational	Keyword(s)	One or more significant words used for retrieval of the data element.
	Business Rules	List any business rules that apply to the data including but not limited to: • Limitations on use • Access/security • Update/change requirements • Data history requirements A discussion of business rules can be found at Chapter VI
	Data Source	Where or from whom the data is collected, purchased, or exchanged.
	Managing Application	The name of the application that controls the entering, updating, and deleting of the data contained in the data element.
	Data Standard	If this data element is part of a standardized dataset, indicate which one (e.g.; Cadastral Data Content Standard, FGDC-STD-003, Interagency Trails Data, etc.)
	Data Scope	Indicate the scope of the data contained in the element (local, statewide, Bureau-wide, Department-wide, interagency, national, or international).
	DOI Data Subject Area	The name of the data subject area as identified in the DOI Data Reference Model that contains the data element.

Attribute Category	Attribute	Description
	BLM Subject Code(s)	The BLM subject code(s) supported by this data element (See http://www.blm.gov/nhp/efoia/sfcode-numeric.html).
	BLM ABC Program Element(s)	The BLM Activity Based Costing (ABC) program element(s) supported by the data element (See http://web.wo.blm.gov/abc/Index_Other.htm).
	Authority(s)	The regulatory or statutory authority under which the data is being collected.
Representational	Layout of Representation	The layout of data element values expressed as a character string (e.g.; AA999, AAAA, 99.9). The layout describes the precision for decimal numbers.
	Data Type Name	A designation of the type of data contained in an element (e.g., character, integer, real, etc.).
	Maximum Size of Data Element Values	The maximum number of positions allowed for the data values the element may contain.
	Minimum Size of Data Element Values	The minimum number of positions allowed for the data values the element may contain.
	Value Domain	The singular value(s) or range of values that a data element may contain "(e.g., domain values or code list with definition).
	Value Domain Start Date	The first date the element values are allowed.
	Value Domain End Date	The last date the element values are allowed.
Administrative	Responsible Organization	The electronic mail tool's address book Department code of the organization within BLM that is responsible for the contents of the attributes of the data element.
	Data Administrator Name	The name of the Data Administrator responsible for the contents of the attributes of the data element.
	Data Administrator E-Mail Address	The e-mail address of the Data Administrator responsible for the attributes of this data element.

Attribute Category	Attribute	Description
	Data Administrator Phone Number	The phone number of the Data Administrator responsible for the attributes of this data element.
	Data Administrator Fax Number	The fax number of the Data Administrator responsible for the attributes of this data element.
	Submitting Organization	The Electronic mail tool Address Book Department code of the organization within BLM that submitted the data element and its metadata attributes for consideration.
	Contact Name	The name of the person responsible for submitting this data element for consideration.
	Contact E-Mail Address	The e-mail address of the person responsible for submitting this data element for consideration.
	Contact Phone Number	The phone number of the person responsible for submitting this data element for consideration.
	Contact Fax Number	The fax number of the person responsible for submitting this data element for consideration.
	Comments	Comments about the data element or its attributes.

2. Data Element Naming Conventions

The Bureau of Land Management (BLM) requires data standards for program activities to ensure data can be shared among offices and with partners for more efficient, comprehensive, and up-to-date assessments of public land resources and land status.

Uniformly named data elements will ensure data accessibility and reusability across systems and users. The use of standard naming conventions will ensure that names for all BLM data elements are clear, brief, unique, context-free, and conform to the rules of syntax. Structured format and content for data element documentation:

- Minimize costs associated with the maintenance of identical information in different formats;
- Reduce needless duplication of data collection and storage;
- Reduce redundant data through consolidation of synonymous and overlapping data elements;
- Increase opportunities for sharing data among BLM users and exchanging data with partners;
- Enhance consistent interdisciplinary use of information.

The paragraphs below highlight some of the basic rules for data standardization. For a complete description of the standardized method to be used throughout DOI, please refer to the document, *DOI Data Standardization Procedures*.

a. Naming Convention. A naming convention is a collection of rules, which, when applied to data, result in a set of data elements named in a logical and standardized way. These data element names inform the user about the contents of the data value domain (the set of possible values for a data element), and the usage of the data element in a concise manner. The naming convention assists users to achieve efficient use and reuse of data while maximizing understanding of information both within and outside the organization.

b. Types of Name. Data elements are the product of business needs analyses. Business process modeling is used to perform business needs analysis and identify data elements at the conceptual, logical, and physical levels.

    1. Conceptual – Name development begins at the conceptual data model level. At this stage, information needs are grouped as high level entities or object classes. For example, if "Tree" is an object class and "Height" is a property of "Tree," then the conceptual data element name would be "Tree Height." At this level there is nothing in the name that tells you what kind of tree this is or whether the height is a code, a number, a measure, etc.

    2. Logical – At the more detailed logical data model level, a term is added to describe the form that the domain values (set of possible valid values) can take. This is called the Representation Term and tells you whether the data element is a number, a date, a percent, an identifier, etc. If the Representation Term of "Measurement" is added to "Tree Height," then the resulting logical data element name is "Tree Height Measurement."

c. Standard Names – Logical data element names are often standard data elements (also called enterprise data elements). A standard data element is a context free, shareable, atomic level information item that references a business fact. Standard data elements are reusable data elements that do not belong to any particular business application. They are defined by providing a base name (e.g., Person Last Name) a basic definition, a standard size and format and a standard set of domain values. A standard element may have several physical elements related to it.

d. Physical – Names at the physical level are the names that are utilized in the software. The names should only be abbreviated to accommodate the particular software system being used (e.g.; TREE_HT_MEAS). When abbreviations are necessary, the abbreviation standards will be applied. All physical data elements must be linked (or related) to the logical data element they represent.

e. Naming Convention Rules. The data element name is composed of a Data Object, Data Property, and Data Representation. The Object Class Term names the object or entity, the Property Term describes a specific attribute of the object or entity, and the Representation Term indicates the type or category of

information the element reflects. Qualifier terms describe the data element and make it unique within a context. If new Representation Terms or modifications to Representation Terms definitions are needed, the National Data Standards Change Request Procedures must be followed (See Chapter 4).

The specific rules listed below apply to logical and physical data element names.

1. Semantic Rules – These rules govern what components are parts of the name and any specific rules related to those component parts.

   a. The Object Class term (also known as entities/objects/prime word) is based on the names of entities found in data models or objects found in object models. Only one Object Class term is allowed.

   b. The Property Term is added to describe an attribute of an entity or object.

   c. The representation of the data value domain of the data element is described by the Representation Term.

   d. Only one Representation Term shall be used in a data element. In cases where the Property Term and the Representation Term are repetitive, the Representation Term will be removed (Customer Name becomes Customer Name).

   e. Qualifier Terms are added as needed to describe the data element and make it unique within a specified context (Customer First Name).

   f. The number of Qualifier Terms shall be kept to the absolute minimum required to make the element unique in a specific context.

2. Syntax Rules – These rules specify the arrangement of the name components.

   a. The Object Class term occupies the leftmost position in the data element name unless proceeded by a Qualifier Term.

   b. The Representation Term occupies the rightmost position in the data element name.

   c. The Property Term is located between Object Class Term and the Representation Term.

   d. Qualifier Terms may be positioned anywhere in the name to the left of the Representation Term.

3. Lexical Rules – These rules determine the standard “look” of names.

   a. Nouns are used in singular forms; verbs, if any, are in the present tense.

   b. No special characters (e.g., hyphen, slashes, etc.) are allowed, unless they are part of an approved acronym.

c. All words are separated by a space. Physical names may be constrained by software systems to use other separators (such as an underscore).

d. The first letter of each word will be capitalized and the remainder of the word will be in lower case.

e. Physical data element name length is dependent on the software limitations of the database management system.

f. Logical names are not limited in length.

g. Names should not be abbreviated. Use acronyms, if possible.

h. Abbreviations that are needed will be done in right to left fashion, utilizing the standard abbreviations found in the CMR. When new abbreviations are necessary, they shall be constructed using an abbreviation algorithm supplied by the BLM Data Administrator.

i. Prepositions (e.g., at, by, for, from, in, of, to) are not allowed except in cases where they are required for clarity (e.g.; Applicant Power of Attorney Code).

j. Articles (e.g., a, an, the) are not allowed.

k. Conjunctions (e.g., and, or, but, etc.) are not allowed, except in cases where they enhance clarity (e.g., Animal Wild Horse or Burro Code).

3. **Contact Information**

Metadata Reports (including those for geospatial metadata) contain fields for the entry of "contact" information. This can be for various purposes, depending on the context in which it appears. For instance, contact information appears in the Identification, Data Quality, Distribution, and Metadata Reference sections. What these all have in common is that they all represent a person or organization that is knowledgeable about a particular aspect of the data set.

a. The contact in the Identification section knows about the data content

b. The contact in the Data Quality section knows about the processes that were applied to the data.

c. The Distribution section contact knows about how someone can get access to or a copy of the data.

d. The Metadata Reference contact is who you would go to if you wanted to know something about the metadata record itself. These may all be the same person/organization or they could all be different.

4. **Required Contact Information for Geospatial Metadata**

Contact information in geospatial metadata is defined in the document "Content Standard for Digital Geospatial Metadata (FGDC-STD-001-1998)" developed by the Federal Geographic Data Committee (FGDC). This is a government-wide standard that applies to all Federal agencies. Not only does the standard define what information is needed for a contact, it also specifies if and when such information is required. The standard states that if a contact is required, you must enter *either* a contact name or a contact organization. You must provide an address and voice telephone number for the contact. Other pieces of information about the contact (position title, email address, fax number, hours of service, etc) are optional.

5. **Optional Contact Information for Geospatial Metadata**

Contact information (in total) is **optional** in the Identification and Data Quality sections and **required** in the Distribution and Metadata Reference sections. The purpose of the contact information is to provide someone who is looking at the data, using the data, or wanting to acquire the data a place to go to get information they need.

6. **Identifying Appropriate Contacts**

When deciding whether to use a person's name or an organization's name several things need to be considered:

1. Privacy – While employees might cite this as a concern, use of Employee names, office phone numbers, office email addresses are not protected by the Privacy Act, since they are government employees and this information is public record. However, cell phone information or home address or home telephone would create a Privacy Act issue. When your name appears on a geospatial metadata record it eventually becomes available over the internet since these metadata records are provided to the FGDC clearinghouse network and to Geospatial One-Stop to enable data searching and discovery. The Oregon State Office, which has nearly 400 metadata records in the clearinghouse (all with employee names associated with them), has not had problems with harassment or inappropriate use of employee names. If there are concerns expressed, considered using first name initials or only last names.

2. Service to the Public/Other BLM employees – is the person that is trying to use the data or thinking about acquiring the data going to be better served by having a name of an employee to call or by an organization. That depends on how you are organized. If there are a number of people within a group that is knowledgeable about the data set, then maybe an organization is best to list. That way, if someone is gone there is someone else there to answer questions. However, if there is only one person that knows the data set or is the only person to talk to about getting a copy of the data set, then listing that person is best. That way people's requests are not being passed around, perhaps never getting to the right person.

3. Maintenance of metadata records – in order to be useful, metadata needs to be kept up to date. In an organization where people are moving around a lot (either between positions or organizations) maintenance of individual's names can be difficult. This is also an issue of volume. If you are only managing a few records then maintenance of them is not a big issue. If you are keeping hundreds or thousands of records, then maintenance of those records needs to be considered. Of course, organizations and

their information also changes (new phone numbers, new addresses) so use of organization contacts does not totally alleviate this problem.

Recommendation: It is recommended that contact information contained in the Distribution and Metadata Reference sections of geospatial metadata be based on individual people and not organizations. In the Identification and Data Quality sections it is less important to have an individual's name and can be left to the preference of the local office.

Chapter 7: Developing Data Standards

A. Applicability

This guidance provides help for selecting, modifying, adopting, or creating data standards for the BLM business activities. It also covers implementing and maintaining those standards. It can be used in a variety of ways, from selecting an existing industry standard to the opposite extreme of developing a brand-new standard to meet a need that is not served by existing standards. Most of the time, it should be possible to adopt, or to adapt, existing standards for national use. However, this guidance also provides the steps to follow in developing a new standard. Less complicated efforts can pick and choose appropriate steps, so long as the consultation and approval actions are completed formally.

This guidance applies to all types of standards, however categorized. For example, it applies to what are commonly called content standards, display standards, data entry standards, quality standards, metadata standards, and all other categories of standards. In this regard, geospatial coordinates and related information are regarded as a special form of content standards, and are included within the scope of this guidance.

B. Metadata and Data Standards

All data requires metadata collected to one or more national metadata content standards. All geospatial data must have metadata that meets the Geospatial Metadata Content Standard of the Federal Geographic Data Committee (FGDC).

The metadata content standards are not independent of the standards for data. Metadata standards must be applied as the data is collected, by completing the associated metadata in parallel. Because metadata content has to be collected with the data, the data standard itself must support the creation of the descriptive information that will be stored in the metadata record. See Chapter IV for metadata requirements.

C. Retrofitting Existing Data to a New Standard

One implication of adopting a new standard is that existing data in active use should be retrofitted to meet the standard. However, retrofitting existing data to a new standard can be expensive, and even infeasible. Data standard adoption teams will make recommendations on what data to retrofit, and on what schedule, based on business needs and their subject matter expertise. The decision whether to follow those recommendations will be made on a case-by-case basis by the affected the BLM business programs.

Note that “retrofitting” data implies modifying a *copy* of an original data set. The original data set is itself subject to all the dictates of the Records Act and the BLM Records policy, and will not be disturbed.

D. Adopting Data Standards

Whenever feasible, the BLM will adopt—not duplicate—data standards from FGDC, International Standards Organization (ISO), Federal Information Processing Standards (FIPS), industry-sponsored consensus standards groups, and Federal and State agencies. No new standard adoption effort will be undertaken if any such external opportunity exists.

Preferably, most BLM data standards will be adopted from, or developed in cooperation with, other Governmental organizations or industry standards-setting bodies. OMB Circular A-119 authorizes and encourages Government agencies to participate in industry consensus standards groups, in order to establish data standards that serve the needs of related Government agencies and of industry.

E. Data Standard Levels

As a practical matter, not every BLM standard can be national. At least three situations can justify a State-level or regional standard:

1. A resource (or a certain characteristic of a resource) is unique to one or a few BLM jurisdictions.

2. No national standard exists or can be created quickly enough to meet a pressing business requirement.

3. BLM is one participant in a multi-agency cooperative study or land management effort, or has entered into a data collection and sharing agreement with external partners (other Federal agencies, state government, Tribes, and non-Governmental organizations) and must conform to standards adopted for that particular purpose. This can also occur when a State standard is dictated to the BLM by law or agreement.

Even in these cases, the data standard adoption team for the particular data topic should be asked to help investigate alternatives and to take part in the decision process. As a matter of BLM policy, adoption and use of a national standard is preferred, and managers who approve State or other standards for a specific purpose must be prepared to document and justify that decision.

Where non-national standards are adopted, those standards should extend and incorporate existing components of any related national data standard. That is, State and other standards may add to, but should never be inconsistent with, a related national standard. The resolution of any inconsistencies or technical conflicts must be resolved by the data standard adoption team as part of its regular deliberations.

F. Responsibilities

It is a major responsibility of each National Data Steward to identify, assess, compile and maintain the status of standards and business data in progressing toward standardization. The National Data Administrator will accomplish this by establishing a Bureau-wide standing committee of State and Field Data Stewards for their category of data. This compilation will indicate the timing and strategy for adopting and applying national standards, and be consistent with State or local extensions of those standards to meet BLM business needs most effectively.

Data Stewards can adopt any workable combination of tactics for evolving toward the desired standards. For example, one approach is to accept temporary use of a local standard, while "mapping" or "aliasing" the names and definitions from one standard to another. Because this is so time-consuming, it may be feasible only in a few critical situations. Another tactic is to obtain national program management agreement on the "core data" within a business program, and to focus efforts on those first. (Core data is that data for which BLM is the logical lead organization to establish Government-wide standards.) This tactic could include finding and adopting national standards from other agencies and organizations that have (or ought to have) primary responsibility for them.

Key jobs must be assigned and performed in order to adopt a data standard. High-level definitions of data management roles and responsibilities have been created and are available in Chapter III and its appendices. Further details on those roles, as they apply to data standards, is provided at Appendix G.

G. Steps in Managing a Data Standard

1. **Proposing a Data Standard.** In summary, proposing a new data standard requires the following steps:

    a. The BLM business community requests the appropriate National Data Administrator to provide a new data standard. (In general, the Data Administrator will serve as a conduit to the affected business community.)

    b. A data standard adoption team leader and data standard adoption team are appointed by the National Data Administrator, and they then develop a proposal for the new standard. This proposal sets out all the information needed by management to decide whether this effort should go forward.

    c. The draft proposal is evaluated by the business community, State Data Administrators, and others, and eventually is finalized by the data standard adoption team. A request for approval is routed to management of the benefiting activities. If approval is received, the approved proposal advances to the next step, "Adopt Data Standard."

Proposing a new data standard will involve two steps: first developing the proposal, and then evaluating it. The entire standard adoption job begins with receipt of a request for a new data standard from the benefiting BLM business activity. Each National Data Administrator will be charged with creating and maintaining a transition plan, which contains a prioritized list of requirements for new standards that fall within the Steward's area of responsibility, against which the need for this standard will be gauged.

Major standard adoption efforts may best be managed as formal projects. In those cases, the data standard adoption team will develop a scope, strategy, work breakdown structure, schedule, and budget for BLM participation in adopting the standard, and will track progress and costs throughout. The team will identify stakeholders, within and external to BLM, who will be included in reviews of team products. The team will consult with other organizations and the Data Management Branch to both ensure the new standard does not duplicate suitable existing or emerging standards; and obtain the widest appropriate participation of government and industry in the standard adoption process. Straightforward adoptions of existing standards may dispense with the more formal elements of project management, but this should not be seen as license to skip formal approvals or coordination processes set out in this guidance.

The National or State Data Administrator will identify a data standard adoption team leader, and obtain necessary management approvals. The data standard adoption team leader will nominate appropriate specialists to participate in a data standard adoption team, and will obtain management approvals.

In the first step, the data standard adoption team produces a draft proposal to adopt a data standard. The content requirements for a data standard proposal are provided in Appendix J. A proposal is desirable because of the significant commitment of labor and travel funds implied by some of these jobs, and to communicate to all interested parties the intended scope and participation by industry and government in the effort. The data standard adoption team may request further information or clarification from the business source of the request for the data standard. This request will be coordinated by the National Data Administrator.

The desired content of a standard adoption proposal includes information on the scope and need for the data standard, specific business benefits, the overall schedule and milestones, participants and stakeholders, data quality issues, and program impacts of adopting this standard. An important element of the proposal process is evaluating if existing external standards will serve the need, or if parts of one or more existing standards can provide a useful starting place.

Formal evaluation of the draft proposal is the first opportunity to engage all the reviewers who represent stakeholders in this project. The data standard adoption team leader will ensure that reviewers get this opportunity, and that their concerns and suggestions are considered. The review process must include the appropriate levels of management. (See Appendix I for manager responsibilities.) When a final proposal is ready, the data standard adoption team leader will forward it, through the National Data Administrator, to Bureau Data Administrator.

2. Developing the Data Standard

Developing the new data standard involves four major steps, as follows:

1. The data standard adoption team produces a draft report by going through the steps approved in their proposal.

2. A broader audience of reviewers, including the business community, evaluates the standard.

3. Evaluation results provide the basis for preparing a final standards report, which goes through a review cycle.

4. After comments have been addressed, the final data standards report goes through the formal Instruction Memorandum approval process.

   The adopted final standard then is routed to the Data Management Branch, which then adds it to the BLM's central standards database in the Corporate Metadata Repository (CMR).

   The major work of adopting a data standard will be performed by the data standard adoption team and data standard adoption team leader. This team may include members from outside BLM, and in fact, could be led by a representative of another

organization. In such a case, the BLM data standard adoption team leader still is appointed, and manages the BLM team participation and approval processes.

Work on the standard begins when resources are allocated by management. An Assistant Director typically will serve as the project sponsor for national standards; the State Director for State-level standards. The methods used to adopt the draft standard are adaptable, and will vary with the situation. However, any method should include at least the following steps:

1. Establish team administration rules and agreements to govern membership, resolution of disagreements, and meeting schedules.

2. Coordinate and interact with related standards development or maintenance efforts. Review existing standards and formats, as well as common practices in the field, to confirm the earlier, proposal phase determination of whether, and to what extent, this effort can build on existing standards and experience.

3. Maintain continuing informal review by a broad spectrum of professionals in the affected field, in order to migrate successive drafts toward a consensus that serves most needs, and that will survive formal review in subsequent steps.

4. Perform formal project management. This is especially important in this particular step, because the constant reviews may very well yield recommendations to expand or redirect the scope of the standard. Changes in scope may be perfectly appropriate. However, the data standard adoption team leader must ensure that any proposed change in scope is evaluated for impacts on the work breakdown structure, schedule, budget, and risks.

5. Create thorough documentation of team meetings, decisions, and products. These must be managed and maintained according to the dictates of the Records Act, during and after the project.

6. Perform formal testing of the draft standard, against a challenging variety of data sets.

7. Conform to OMB Circular A-119, Executive Order 12906, and any other relevant directives.

8. Ensure that the effort complies with all DOI and Government-wide directives concerning implementation of the Extensible Markup Language (XML), including mandatory creation of XML vocabularies.

9. Develop implementation cost estimates, i.e., the direct cost of changing a standard and obtaining new consensus; the costs to BLM in lost productivity during the conversion; and the costs associated with modifying data bases, data content, metadata, and automated applications that employ affected data.

   In cases where a standard is developed cooperatively with another agency or an industry consensus standards organization, the particular standard development process may be dictated by that organization. If, for example, a standard is being developed under the umbrella of the American National Standards Institute (ANSI),

the ANSI processes will be appropriate. If the standard development process is internal to BLM, or there is no prescribed process, BLM data standard adoption team leaders should use or adapt the processes set forth by the FGDC. Detailed guidance for every step of the FGDC process can be found at: http://www.fgdc.gov/standards/directives/directives.html

It is required that FGDC procedures be followed wherever feasible. When it is not feasible, the team lead will document the rationale and transmit it to FGDC as feedback on their process.

3. Final Reviews and Adopting the Data Standard

All of the remaining steps of "*Adopt Data Standards"* address review, revision, and adoption of the draft standard. The exact steps also may be dictated by mandatory processes of another organization, but the processes described here are generic. Use these steps for internal BLM standards adoption. If an external methodology is used, ensure that the same basic work and information flows are included.

Refer to Appendix K for the format of a new BLM standard report. (See Appendix K for a completed sample data standard.) The draft report includes three main parts:

1. General description of the standard
2. Characteristics of the data sets
3. Characteristics of the data model.

The introduction to this report should update the information from the proposal document about scope, purpose, benefits, stakeholders, criteria, and implementation costs, plus describe the participants, processes, comments, and conclusions of the study itself.

After a draft team report has been completed, it is sent to the stakeholders for their review and comment ("*Evaluate Draft Data Standard Report"*). (The data standard adoption team will determine its stakeholders early in the project, and will update this list as needed throughout the project.) Their evaluation should be guided by any criteria, requirements, or directives regarding the standard that may be provided by the business component of the BLM or other participants. These criteria, at a minimum, would include the original statement of requirements that initiated this standard-setting effort. The evaluation process also may include sending the draft report to reviewers from the public, other affected agencies, and any regulatory bodies that could be affected. For example, a river management commission may be vitally interested in the exact nature of water quality data that will be collected after a new standard is adopted.

The data standard adoption team leader will consolidate all stakeholder comments into a record document or memorandum, with an indication of the appropriate disposition of each. Depending on the extent of revisions required, the manager then will pass the comments back to the data standard adoption team with instructions either to redraft the standard, or prepare a final standard report. If a redraft is required, the result must be routed back through the evaluation process.

The final, fully-reviewed standard report is forwarded to the appropriate National (or State) Data Administrator, who will coordinate approval steps with the Bureau Data Administrator, the sponsoring Assistant Director, and others who may have approval authority. An approved

final data standard, which will be surnamed and issued as an Instruction Memorandum, is routed by the National Data Administrator to the next process step, *"Implement Data Standard*," and to the Data Management Branch (WO-570), to ensure that the new standard is listed in BLM's Web-based central standards database in the CMR.

4. Implementing the Data Standard

a. Implementing a new data standard or modification means putting it into effect for new data collection, and converting existing data to the standard when cost-effective. The implementation steps are:

1. Develop an implementation plan, to structure Bureau-wide work on implementing the standard.

2. Implement with oversight and reporting by the Data Administratorship team.

b. Implementing a new standard normally will be a long-term process. All new data that is collected will conform to the new standard. Modifying existing data sets into conformity will proceed only as business needs dictate. Collection of new data to the standard may require significant changes to existing software and data bases, and may be delayed. Business needs may dictate that one existing data set be retrofitted to the new standard immediately, while other data sets transition only as new data replaces old. These business needs are incorporated into an implementation plan, created and executed in this step, as follows:

1. After the final data standard has been approved, the data standard adoption team will coordinate the creation of a practical implementation approach, in close cooperation with the National Data Administrator and all stakeholders. Extensive coordination is required because only BLM business interests can specify priorities and long-term schedules, and make credible estimates of the costs and labor required. If this step is performed effectively, the development and evaluation of the implementation plan will be simplified.

2. Having outlined a general approach, the team can proceed to develop a formal implementation plan. The implementation plan should include all the elements of a project plan, to include scope and objectives, success criteria, methods, responsibilities, work breakdown, schedules, budgets, and risk assessment.

3. This plan will receive widespread review by the established list of stakeholders, and any concerns will be addressed.

4. The final implementation plan will be submitted for BLM management approval and funding. The plan will be implemented by an Instruction Memorandum.

5. An approved implementation plan will be executed under leadership of the National Data Administrator. The National Data Administrator and data standard adoption team leader will decide whether the data standard adoption team should be retained over the entire implementation period, and in what capacity.

5. Maintaining the Data Standard.

Maintaining a data standard is an organized activity to monitor how well the standard is meeting needs, and to authorize and execute changes when appropriate. Changes, in turn,

must be implemented and recorded in BLM's central data standards repository. This repository is currently part of the Corporate Metadata Repository.

The direct responsibility for maintaining a standard will lie with the National Data Administrator. The National Data Administrator may retain the data standard adoption team, or a successor team, as a long-term consultant to perform the maintenance steps listed below.

a. Maintenance steps will typically include the following:

1. Evaluate Data Standard Usefulness Solicit and analyze feedback on how well each standard is working. Also, evaluate the actual adherence of data content to each data standard, as an indicator of problems or inadequacies in the standard. Ensure that the experience and interests of external agencies and customers are considered fully—a revision will have impacts beyond the bounds of the BLM. Implementation of any data standard, as well as programmatic experience in using the standard, may generate requirements for changes to the data standard. These would normally begin the maintenance process for a data standard.

2. Evaluate Change Request Evaluate requests for changes to determine whether they are valid and whether they represent a need to modify the data standard, or whether this is simply a minor maintenance need. This evaluation requires a balancing act by the data standard adoption team. Standards are often compromises, and the Data Administrators will have to balance the value of changing a standard against the problems and costs associated with updating and modifying the standard, the actual data governed by the standard, and the metadata.

3. Modifications A "modification" requires changes to the structure or definitions of the data standard. These are the type of changes that would cause existing data to be re-collected, edited or converted to meet this new structure or definition. Some examples would be: the addition of new data elements; the splitting of an existing data element into multiple data elements; or redefining a data element so that the meaning is different than originally established. A modification request would be forwarded to the "proposed data standard" process to go back through the steps involved in proposing a data standard (thus ensuring that all stakeholders are aware of this proposed change and agreement has been reached).

4. Maintenance "Maintenance" does not significantly change the structure or definitions contained in the data standard. These are minor changes that would not cause the re-collection or edits to data. Examples might be correction of spelling or the addition of a domain value that is within the original confines of the data element. Maintenance requirements are forwarded to the "revise data standard" business process to implement the change.

5. Revise Data Standard Make maintenance changes to the data standard. The revised data standard is sent to the Data Management Branch (WO-570) for posting to the central standards database in the CMR.

6. Evaluate Usefulness of the Revised Standard Periodic evaluations will provide information to the National Data Administrator about when it is necessary to repeat the whole revision cycle above.

7. Retire and Archive Standard Standards that are no longer needed, or suitable for the revision process, will be formally retired, by Instruction Memorandum, and archived along with all records associated with their development, revision history, and use with decision data.

H. Supplemental Procedures for Data Elements.

The following processes/procedures supplement the steps outlined for the development of data standards. The primary purpose of this supplemental information is to streamline the processes and outline the procedures for changing data standards (e.g., data elements) that currently exists in the Corporate Metadata Repository (CMR).

Any BLM employee may initiate a change request and it must be based on a business need. The change request is coordinated with the initiator's Data Administrator and local Data Administrator. The Washington Office (WO) may select a Data Administrator to work on the change request. The Data Administrator will obtain preliminary feedback from the National Data Administrator, who, based on business requirements may approve, modify, or reject the change request.

1. The Data Administrator must research existing data standards and verify that no conflicts with current data standards exist. The Data Administrator reviews, approves, revises, or rejects the change request if it is not needed.

2. A description of the proposed data standard change should be jointly developed by the initiator, Data Administrator, and National Data Administrator. The description includes: the name of the change request (e.g., use keywords to reference the change request), definition, business requirements (why it is needed), related business program area, related existing data standard (e.g., cite Instruction Memorandum number), data element number (if applicable), associated applications, metadata requirements, domain codes and attributes, business rules (source documents, currency, accuracy, and precision requirements) and procedures, data cleanup impacts, etcetera. The description also includes the name, office code, and phone number of the initiator (if applicable), Data Administrator, National Data Administrator, Data Administrator, and due date for comments.

3. The Data Administrator sends the proposed data standard change request via email to BLM_DALIST, National Data Administrator, Data Administrator, and any other affected parties suggested by the National Data Administrator. The change request should state that comments are to be submitted to the Data Administrator and National Data Administrator for review.

4. Data Management (WO-570D) assigns an analyst to assist the Data Administrator, Data Administrator or Data Administrator by researching technical and business issues and provides comments on the change request.

5. All Data Administrators review the change request, solicit comments from users, compile final comments with review and concurrence of the State Data Administrator, and forward comments to the Data Administrator and National Data Administrator.

6. The Data Administrator collects, coordinates, and analyzes comments with the initiator and the National Data Administrator. National Data Administrator approves, modifies, or rejects final request.

7. The Data Administrator completes final National Data Standard Change Request which includes final request and comments submitted with analysis (adopted, rejected, reason, etc.) and sends via email to BLM_DALIST, National Data Administrator, and Data Administrator.

8. The Data Administrator submits the final National Data Standard Change Request to Data Management (WO-570D) via the change request tool to have the change entered into the CMR.

9. Once the approved change is added to the CMR, the CMR representative emails a message to the Data Administrator who verifies the change is correct. The Data Administrator confirms accuracy of the change with the CMR representative.

10. The CMR representative emails a message to the BLM_DALIST, Data Administrator(s), and National Data Administrator(s) announcing the update.

11. The National Data Administrator issues a directive with the final National Data Standard, program, workload priorities, cleanup requirements, and time frames for implementation. National Data Administrator emails courtesy copy of directive to BLM_DALIST

12. The Data Administrator coordinates the update of the decode tables, mass changes, and any other applicable software application changes including reports where needed with the Data Administrator and/or National Data Administrator and notifies them when changes are completed.

I. Data Standards Implementation Plan

Orderly migration of the Bureau's legacy data to new standards will support data sharing and re-use, reduce data duplication and costs, and supporting the Bureau's transition to a more efficient Enterprise Architecture. However, migration can be costly, complex, and disruptive, if changes are not carefully planned and shared.

Direct responsibility for leading data migration to new data standards belongs to the Data Administrator, at National or State level as appropriate for specific data sets. Frequently, multiple data sets from the States will require migration in a coordinated fashion, to minimize the very real potential for business disruptions.

The Data Standard Implementation Plan Report is provided in Appendix M as an aid to Data Administrators in planning, tracking, and reporting on the progress their teams are achieving. This format will be completed at the outset of every data migration (even if only one data element is affected), and will be updated at least monthly throughout the process, and maintained until all data sets that are to be migrated have been successfully migrated.

In addition, the Data Administrator is required to submit this form, and its monthly updates, to the Manager, Data Management Branch, for posting on the National Data Management website. Through these web postings, all BLM professionals who are affected by data changes can obtain updates throughout the project, and will have the opportunity to communicate concerns or pertinent information to the data standard adoption team and Data Administrator.

Chapter 8: Documenting Business Rules

A. Background

This Chapter defines the Bureau approach for identifying, defining, and constructing business rules and provides:

1) Guidelines for collecting and submitting business rules.

2) Definitions and examples of business rules.

Guidance for business rules collection ensures business rules are collected and documented in a uniform and common manner. An approach is provided for collecting information that contains the context, rationale, and enterprise architecture significance of business rules. Within this document, the terms “data” and “information” are used interchangeably.

B. Definition

Business rules describe the limitations put on the business either by practices or by legal authority. They provide a formal structure for understanding the business operation. There are generally two perspectives from which business rules are described:

1. From a business perspective, business rules are operating principles that define and control business activities and the products and services they deliver. Business rules typically define who can take what actions and under what circumstances, and are generally expressed in terms of policy, procedures, and guidelines. Subject matter experts are the main sources for information on these types of business rules.

2. From an information system and data perspective, business rules dictate how data is managed and accessed. These types of rules specify constraints on the creation, update, use, archival, and disposal/deletion of data. These types of rules may be created by the subject matter expert and Data Stewards, but may also be created by the developer and data experts for a particular application in conjunction with the subject matter expert and Data Stewards.

C. Purpose

Identifying and documenting business rules generally occurs during business process analysis or Business Process Reengineering (BPR) and/or system requirements development. We collect business rules to:

1. Analyze what information the business needs to support its activities

2. Identify and document the Bureau’s business priorities and policies.

3. Provide traceability and accountability for business decisions to our public.

4. Gain an understanding of the BLM’s national and state information technology (IT) needs in relation to the actual business processes they support.

5. Improve and support data quality and integrity by defining and documenting the data requirements needed by the BLM.

6. Document business knowledge, which can be used to educate and train new employees.

7. Provide better communication within BLM business units, as well as between the BLM and private businesses and other government agencies (i.e., establish a platform for business collaboration/partnerships) which will facilitate the exchange of information.

D. Benefits of Documentation

Administration priorities, laws, regulations, and technology often change and the systems and business processes that help us meet business objectives are affected by those changes. Documented business rules help to identify the impact of such changes. Understanding where business rules are redundantly implemented helps to identify overlaps in operational procedures, thereby aiding business process reengineering. While it can involve a tremendous amount of work, documenting business rules provides a basis for identifying areas where the Federal Government can consolidate business functions, allowing agencies to make better business decisions.

E. Responsibility

Subject matter experts and Program Leads, functioning as Data Stewards, document the business rules for their respective subject areas and are responsible for their creation and maintenance. Managers and supervisors also need to ensure that business rules are created and maintained. Data management professionals (data administrators, managers, architects and analysts) assist by outlining the business rules process, documenting the rules in the proper format, and ensuring the rules are stored in the Corporate Metadata Repository (CMR).

F. The Business Rule Concept

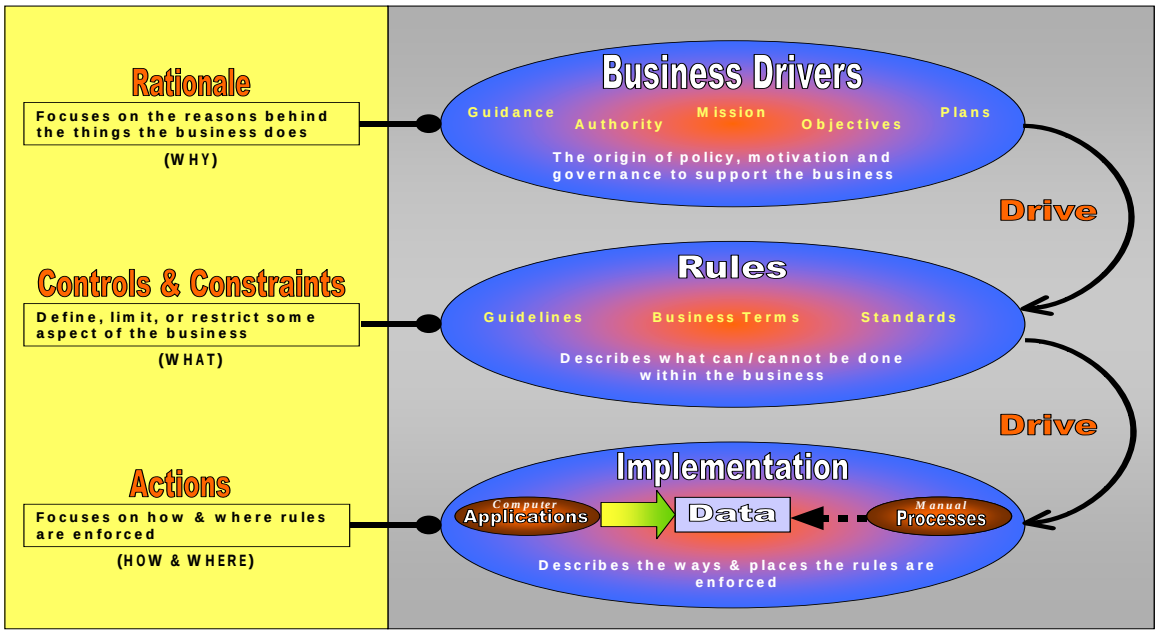


FIGURE VIII-1 Business Rule Concept diagram demonstrates the overall business rule concept. Business Drivers, Rules, and Implementation are described in the following pages.

1. **Business Drivers.** Business drivers are the policies, rationale, motivators, and governance procedures that define and shape the business. When collecting business rules, the source of the driver should always be identified for traceability and validation. Business drivers provide insight into why the BLM does what it does, what it can and

cannot do, and how it does it. *Why* the BLM does what it does can be thought of as rationale. Rationale focuses on the reasons (business drivers) behind the business activities, and what external and internal forces direct the business to do.

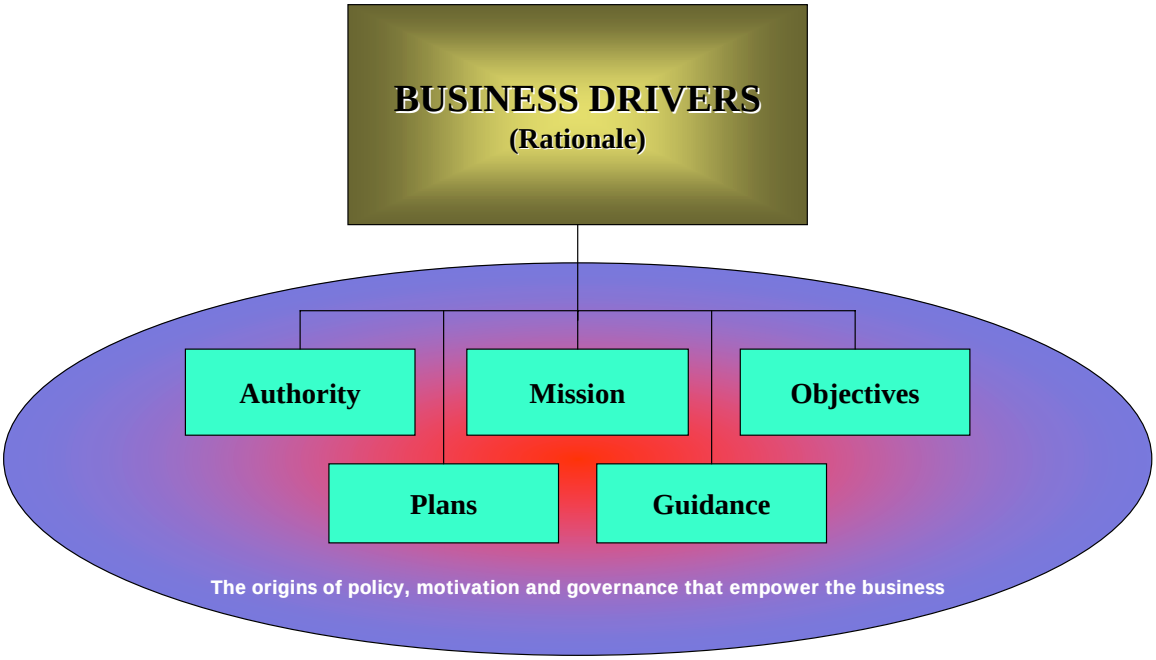


FIGURE VIII-2 Types of Business Drivers diagram describes the various types of business drivers. There is an implied relationship between the various types of sources, but no specific hierarchy or precedence is implied.

a. Several components comprise Business Drivers:

1. Authority - A law, decision, etc., that defines a specific mission requirement or position and high-level constraints. It can be in the form of a Public Law, Executive Order, Congressional Act, Code of Federal Regulations, etc.
2. Mission - The high-level goals or outcomes the business is meant to achieve. The mission tends to drive objectives, plans, and guidance.
3. Objectives - A statement of an attainable, time sensitive and measurable target or state the enterprise intends to maintain, sustain or improve.
4. Plans - Documented procedures and tactics for a course of action (e.g. strategic plan, land use plan, work plan). Plans indicate the ongoing operational activity and describe what the business is or will be doing on a day-to-day basis.
5. Guidance - The directions and procedures that provide the framework and means to implement the mission, objectives, and plans of the business. Internal and external policies, procedures, directives, manuals, and handbooks are examples of guidance.

2. **Rules.** Rules define, limit, or restrict some aspect of the business. Rules assert business structure and influence business behavior and are governed by the Business Drivers. Rules focus on what can/cannot be done within the business to meet its mission.

Figure 3 describes the types of rules that control and constrain how the BLM conducts business.

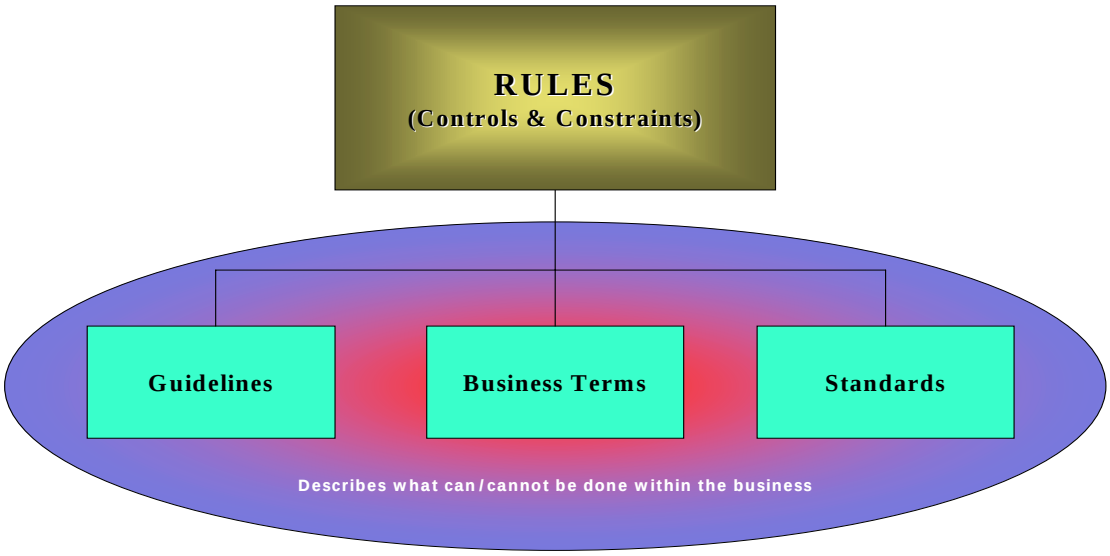


FIGURE VIII-3 **Business Rule Controls & Constraints describes the types of rules that control and constrain how the BLM conducts business.**

a. The types of rules are defined as follows:

1. Guidelines – Guidelines are business statements containing instructions, practices, recommendations, etc., that are not mandatory, but are desired for the business activities. Words or phrases in these statements include optional, recommended, might, could, may, should, etc. Guidelines often set the boundaries or limits for acceptable or desired results from the business activities (e.g., Before a Land Use Plan is prepared, there must be a Pre-Plan showing the types of concerns the specific plan will attempt to address). Examples of sources for guidelines are Best Management Practices, Standard Operating Procedures (SOPs), technical notes, information bulletins. Quite often, guidelines become *mandatory* over time.
2. Business Terms – A business term is a word or phrase with a specific meaning for the business in some designated context. Business Terms refer to items of significance to the business, such as: case (Case Recordation context vs. Law Enforcement context), plan (Land Use Plan context vs. Project Management context), assessment (Dams Inspection context vs. Land Withdrawal Actions context), or customer (Grazing Billing context vs. Contracting context).
3. A business term is a phrase that references a specific business concept. Business terms are independent of how they are represented within the information resource. Ultimately, as business terms are documented, the BLM will possess a valuable "glossary" of its business vocabulary.
4. Standards – Standards specify restrictions on the results actions can produce, conditions on actions, or impose limits. Words or phrases in these statements include must, shall, must not, shall not, will, cannot, etc. Standards include mathematical calculations, inferences, facts (a statement of business-relevant observations), and dynamic aspects of the business.

Standards also specify rules about format and content of information about items in which the business is interested.

3. Implementation.

Implementation is the act of putting the techniques and measures in place to execute both automated and manual business processes governed by the business rules. The activities and methods that are implemented to make the rules a reality can be categorized as "actions." Actions describe how and where the rules are enforced or carried out. Implementation statements include detailed computations or technical controls, limitations, or restrictions on the data, and may be carried out manually, automatically (computer systems), or both manually and automatically.

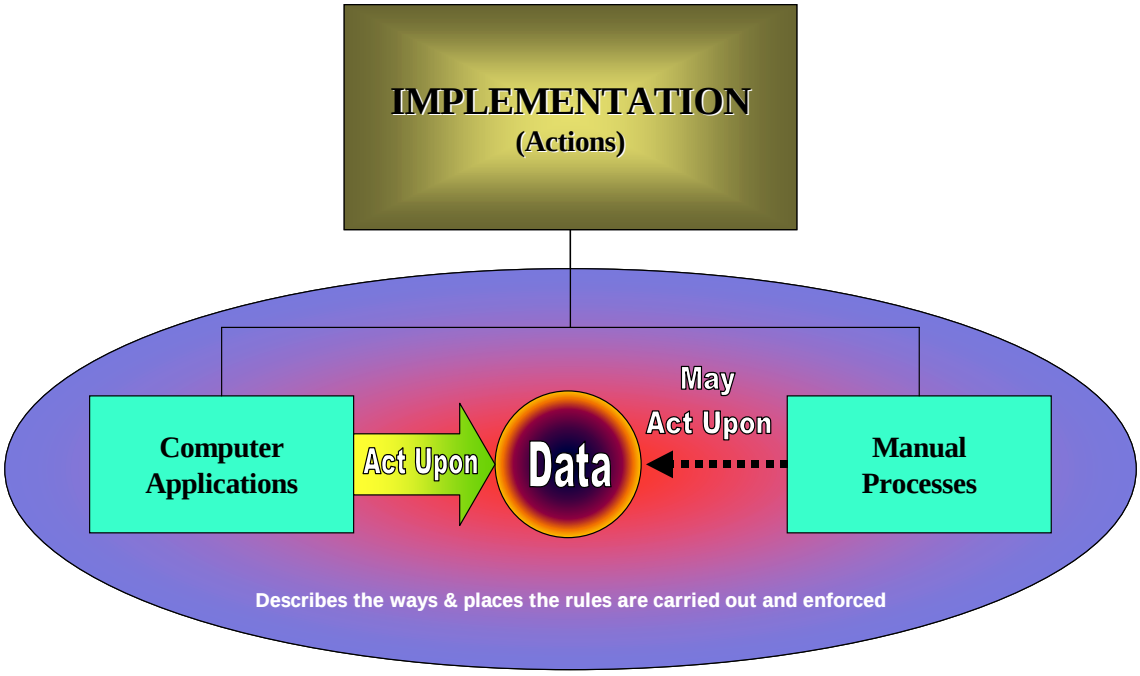


FIGURE VIII-4: **Business Rule Implementation describes how and where the rules are executed**

a. Implementation includes several components:

1. Computer Applications/Calculations **-** Computer applications used to perform a logically related set of activities that collectively execute the business rules. For example, "The annual rental fee for grazing land is calculated as: annual_fee = nmbr_acres x rntl_rt, as stated in the RAS System Specification document."

2. Manual Processes **-** A logically related set of activities that collectively accomplish a measurable business goal not using a computer application environment. The intent here is to collect information about the way business rules are implemented without the aid of automation. For example, "We must get the customer's name and address in order to complete the EOI form, as stated in the EOI Operations Handbook."

As depicted in Figure 4, not all manual processes affect data. Many required procedural business activities do not create or maintain data (e.g., rules of employee conduct, rules around the personal use of BLM equipment, how to submit an application).

G. Business Rule Process

The following diagram is a high-level overview of the general processes for business rule management:

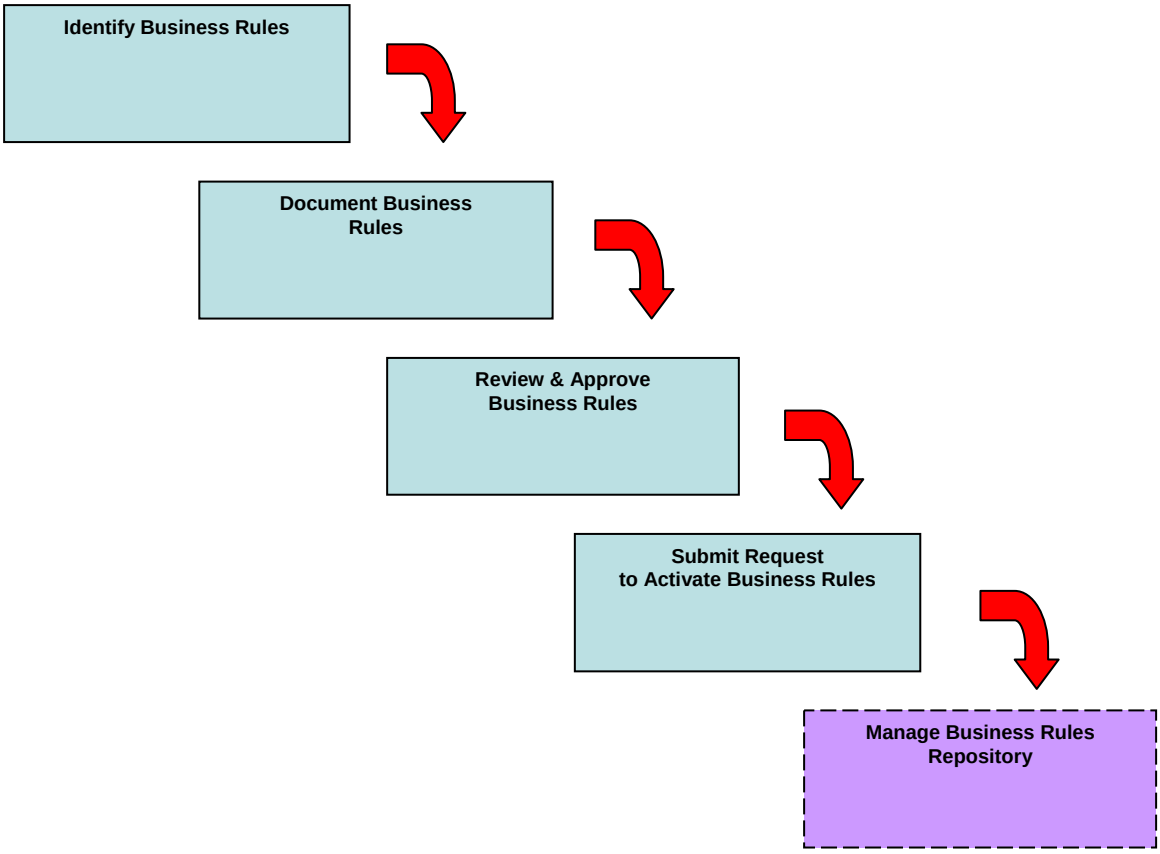


FIGURE VIII-5: **Business Rule Process**

1. The processes involved in business rules are:

   a. Identify Business Rules. The identification of business rules generally occurs during BPR, data standards development, and/or system requirements development. Usually Subject Matter Experts (SME) discover and develop business rules, but anyone may find a business rule and propose its adoption to the National Data Administrator.
   b. Document Business Rules. Each Business Rule requires a definition, source and other related metadata. An application will be provided for documentation of Business Rules – still in progress.

c. Review and Approve Business Rules. Business Rules need to be reviewed for completeness and correctness and agreed upon by the SME's and approved by the National Data Administrator.

d. Submit Request to Activate Business Rules. Once the Business Rules are approved, National Data Administrator requests that the Business Rules be made available and accessible.

e. Manage Business Rules Repository. This is the work that the Data Management Branch (WO-570) must do to keep the repository up to date and accurate. E.g. Activate, Modify, Archive Business Rules.

The Manage Business Rules Repository process is shown differently because the Data Management Branch (WO-570) does this work. All the other processes are done by the business (Data Administrators and SMEs). This doesn't mean that you are out there on your own. The Data Management Branch (WO-570) is available and will be glad to help.

While any employee/application is welcome to request business rules to be added to the Repository, it is expected the majority of business rules will be identified through the Bureau Enterprise Architecture, Business Process Re-engineering lab, and data standards efforts (one project at a time). When rules are to be added, modified or deleted, the applicable Data Administrator will coordinate the process.

H. Business Rule Examples

Examples of Guidelines

Example 1:

If the survey type is Lot and the suffix contains "2L", then it can be interpreted as a "half lot".

Example 2:

If the system is LLD and survey type is L, then the suffix field can represent a geopolitical split, duplicate lot, or a partitioned lot.

Example 3:

Watersheds (fifth level, ten digit Hydrologic Unit Code (HUC) will generally be used as the geographic basis for conducting Land Health Standards evaluations.

Example 4:

It is recommended that Resource Advisory Councils (RACs) or their functional equivalent be involved in the land use planning process.

Examples of Business Terms

Example 1:

Land Status -- the cumulative result of those actions that define ownership and limitations on the right to use or dispose of a specific piece of land. Land Status results from an

analysis of title cases, as well as those cases that impose segregations or authorize specific uses on the land. It consists of information pertaining to ownership, outstanding claims, or applications for use or title, segregations, and any other information that might affect how the public land/mineral laws would operate with respect to the particular piece of land involved, as stated in the BLM Glossary of Terms. If no cases exist, the laws and customs of the federal or state governments determine the land status.

Example 2:

Case -- the group of official documents that record facts or actions taken on a specific application, request, or proposal to grant or acquire the right to use, enjoy, remove, or occupy the land, resources, or real property, as stated in the Land Management Handbook.

Examples of Standards

Example 1:

Taking quantity X value, and converting it to cubic yards, as stated in the LR2000 System Documentation, will derive *Amount*.

Example 2:

Total Trail Length is the sum of all individual trail segments, as stated in the National Trails Data Standards Handbook.

Example 3:

unit_capacity = unit_height x unit_length x unit_width

Example 4:

If Data Element Name ends in “cd,” then every entry must be validated against the domain table.

Example 5:

If a bill is cancelled then bill_cancel_date and bill_cancel_time will contain the system date and time that the bill was cancelled.

Example 6:

If oper_last_name or oper_first_name or oper_middle_name is filled in then company_name cannot have an entry.

Example 7:

Oil and gas lease offers filed on lands within a pending application to close lands to mineral leasing shall be suspended until the segregative effect of the application is final as stated in 43CFR 3101.4 (1999).

Example 8:

The business owner's name and address are part of any documentation maintained by the BLM.

Appendix A - Data Costs Worksheet

This spreadsheet provides a worksheet to list by year and summarize data costs in a format consistent with the format used in the Benefit/Cost Analysis Spreadsheet. Line 47 on the following spreadsheet can be copied directly into line 14 on the Project Costs tab of the Benefit/Cost Analysis Spreadsheet.

	A	B	C	D	E	F	G	H
1	**Data Costs Worksheet**							
2		**Data Costs by Fiscal Year ($)**						
3	**Data Activities**	**Total**	**FY 2006**	**FY2007**	**FY2008**	**FY2009**	**FY2010**	**FY20011**
4	**Plan for Data Needs**							
5	Determine Scope of Data Requirements							
6	Provide Access to Documentation							
7	Discover Data							
8	Acquire Data Management Tools							
9	Develop Data Standards							
10	Develop Business Rules							
11	Plan Data Acquisition							
12	Quality Assurance/Quality Control for Planning							
13	**Collect and Acquire Data**							
14	Acquire Data and Metadata							
15	Accept and Certify Data							
16	Quality Assurance/Quality Control for Acquire							
17	**Update and Maintain Data**							
18	Determine Records Requirements							
19	Establish Retention Schedule and Snapshot Requirements							
20	Publish Availability							
21	Perform Daily Data Entry Activities							
22	Maintain Application Documentation							
23	Perform Data Recovery Activities							
24	Perform Data Standards Maintenance							
25	Maintain Business Rules							
26	Maintain BEA Documentation							
27	Maintain Metadata							
28	Quality Assurance/Quality Control for Update							
29	**Provide Access to Data**							
30	Establish Privileges and Access Control							
31	Develop Internal/External Access Plan							
32	Quality Assurance/Quality Control for Access							
33	**Evaluate Data**							
34	Identify, Extract, Analyze Source Data							
35	Measure Data Quality							
36	Perform Data Cleanup Activities							
37	Perform Data Transformation							
38	Perform Data Conversion							
39	Perform Data Validation/Verification							
40	Load Data to Target Architecture							
41	Perform Data Cleanup Activities							
42	Quality Assurance/Quality Control for Evaluate							
43	**Archive or Dispose of Data**							
44	Review Retention Requirements for Data							
45	Store, Archive, or Dispose of Data							

Appendix B – Relevant Federal Orders and Statutes

Federal agencies are responsible for documenting their data assets and planned data acquisitions as information technology procurements and investments.

Federal orders, acts, and circulars relevant to data costs include the following.

OMB Circular No. A-11 - Preparing, Submitting, and Executing the Budget
http://www.whitehouse.gov/omb/circulars/a11/02toc.html

OMB Circular No. A-76 - Performance of Commercial Activities
http://www.whitehouse.gov/omb/circulars/a076/a076.html

OMB Circular No. A-94 - Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs
http://www.whitehouse.gov/omb/circulars/a094/a094.html

OMB Circular No. A-119 - Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities
http://www.whitehouse.gov/omb/circulars/a119/a119.html

OMB Circular No. A-130 - Management of Federal Information Resources
http://www.whitehouse.gov/omb/circulars/a130/a130trans4.html

Clinger-Cohen Act (CCA) – Information Technology Reform Act
http://wwwoirm.nih.gov/policy/itmra.html

Executive Order 12906 - Coordinating Geographic Data Acquisition And Access: the National Spatial Data Infrastructure
http://www.fgdc.gov/publications/documents/geninfo/execord.html

Government Performance Results Act of 1993
http://www.whitehouse.gov/omb/mgmt-gpra/gplaw2m.html

Appendix C - Useful Websites

Archive or Dispose of Data
http://web.blm.gov/data_mgt/dmp/toolkit/dlc-archive.html

Best Management Practices
http://web.blm.gov/itim/bmps/index.htm

BLM National Data Administrators
http://web.blm.gov/data_mgt/contacts/datastewds.htm

BLM Records Administration/Management
http://web.blm.gov/internal/wo-500/records/records.html

Collect and Acquire Data
http://web.blm.gov/data_mgt/dmp/toolkit/dlc-acquire.html

Configuration Management (CM)
http://web.blm.gov/internal/wo-500/cm/cm.html

Coordination and Approval of Data Acquisitions – Data Acquisition Proposal Instructions
http://web.blm.gov/data_mgt/dmp/1_3_Data_Acquisition_11-14-02_FNL.pdf

Corporate Metadata Repository (CMR)
http://web.blm.gov/CMR/index.htm

Data Management Plan 2001
http://web.blm.gov/data_mgt/data_mgt_plan_v-2-1_aFNL.pdf

(The) Data Management Toolkit
http://web.blm.gov/data_mgt/dmp/toolkit/datamainthome.html

Data Management / Administration Personnel and States-Centers Data Management Web Sites
http://web.blm.gov/data_mgt/contacts/DAlist.htm

Data Profiling
http://web.blm.gov/data_mgt/data_profiling/index.htm

Data Quality
http://web.blm.gov/data_mgt/quality/index.html

Data Standards Reference Website
http://web.blm.gov/data_mgt/data_stds_websites.htm

Data Support for Projects
http://web.blm.gov/data_mgt/dm_support.htm

Developing the Financial Analysis for a BLM Information Technology Proposal
http://web.blm.gov/itim/roi/financial_analysis_v1-02.pdf

E-Government Geospatial One-Stop
http://www.geo-one-stop.gov/

BLM Enterprise Architecture
http://web.blm.gov/bea/documentation.htm

Evaluate Your Data
http://web.blm.gov/data_mgt/dmp/toolkit/dlc-evaluate.html

How to Evaluate the Quality of BLM Data
http://web.blm.gov/data_mgt/dmp/1_3_Evaluate_Data_Quality_1-3-03.pdf

Information Resources Management Strategic Plan 2002-2005
http://www.blm.gov/nhp/efoia/wo/fy02/im2002-180attach2.pdf

Information Technology Capital Asset Plan for the Bureau of Land Management
http://web.blm.gov/internal/wo-500/it_cap_exec.htm

IT Investment Management
http://web.blm.gov/itim/

National Data Management and Data Architecture
http://web.blm.gov/internal/wo-500/Data_Mgt.html

Draft (National Data Functions)
http://web.blm.gov/data_mgt/national_data_functions_121602_dft.pdf

National Data Standards
http://web.blm.gov/data_mgt/standards/index.htm

NIRMC Directives – Instruction Memoranda (IM's) & Information Bulletins (IB's)
http://web.blm.gov/nirmc/directives.html

People - Contacts
http://web.blm.gov/data_mgt/contacts/index.htm

Plan For Data Needs
http://web.blm.gov/data_mgt/dmp/toolkit/dlc-plan.html

Provide Access to Data
http://web.blm.gov/data_mgt/dmp/toolkit/dlc-access.html

Record Administration/Management Guidance
http://web.blm.gov/internal/wo-500/records/records.html

Update and Maintain Data
http://web.blm.gov/data_mgt/dmp/toolkit/dlc-maintain.html

Data Administrators for National Systems
http://web.blm.gov/data_mgt/nat_user_reps.htm

Appendix D - Briefing Management on Data Management Roles and and Selection and Training of Data Administrators

The steps below were derived from the strategy used at the BLM New Mexico State Office to brief the State Director about Data Management Roles and Responsibilities, and to begin identifying and training Data Administrators.

1. Brief DSD on data management roles and responsibilities per BLM Manual 1283.
2. Brief State Director on data management roles and responsibilities per BLM Manual 1283
3. Write IM for State Director addressed to DSD's/Field Managers advising managers to identify Data Administrators.
4. Register Data Administrators on website. (See the BLM New Mexico example of a Data Administrator web registration form at http://webapps.nm.blm.gov/dmpsvy/default.html)
5. Data Administrators take Gap Analysis/Needs Assessment Survey.
6. Modify EPAP's for designated Data Administrators.
7. Schedule web-based data management training for FY04 and put cost requirements into state ITIB Process. (Web based data management training is, at present, available in BLM New Mexico).
8. Conduct Training.
9. Modify duty position descriptions for designated Data Administrators.

Appendix E - Sample Instruction Memorandum for Designating Data Administrators

Below is a sample Instruction Memorandum for designating Data Administrators. It was used in the Utah State Office to justify the State Data Administrator position. You can use this IM as a basis for writing a similar IM in your own state.

IN REPLY REFER TO:
1283
(UT-951)
Instruction Memorandum No.
Expires

To: Deputy State Directors

From: State Director

Subject: Utah Data Administrator Designation

The purpose of this memorandum is to designate individuals within the State Office (SO) to serve as Data Administrators for corporate applications. As outlined at the National level, effective resource and program management requires data that is current, accurate and available for use. Although effective data management has always been a key specialist responsibility, recent efforts to formally structure the data management process, through the promotion of system automation and the sharing of information place a greater business value on accurate information. The Data Administrator role must be formalized to identify individuals responsible for specific applications, geographic information system (geospatial) themes, and data structures/tables. These responsibilities can be shared or remain with a single individual in carrying out stewardship responsibilities for one or more programs or geospatial themes.

Although individuals that are identified as stewards may not always be the senior technical expert on an application, topic or component of a topic, they must have an in-depth knowledge of the data used and how the data will be applied in a given process, work product or system application. There will be one state Data Administrator for each corporate application and/or geospatial theme. When applications or themes contain or use data from more than one type, or when themes are used by multiple applications, the stewards must coordinate with the other appropriate stewards to ensure effective management of the data.

Data Administrators have been designated at the national level in a wide variety of categories (http://web.blm.gov/data_mgt/contacts/datastewds.htm). Attachment 1, put together from input received approximately two years ago, identifies Utah's Data Administrators for many of the same categories. Please review this list and provide corrections or additions by April 4, 2003. Attachment 2 provides examples of Data Administrator roles and responsibilities that have been developed by the National Data Management Project. The roles and responsibilities will be formally issued as an Instruction Memorandum from the Washington Office in the near future.

Direct any questions or comments you may have about Data Administrators to Walt Phelps, State Data Administrator (UT951), at (801) 539-4125.

2 Attachments

1 – Utah Data Administrator Designations (2 pp)

2 – Data Administrator Roles and Responsibilities

Appendix F - Roles and Responsibilities to Support Data Management in BLM: Key to Matrix

Abbreviations

Data Admin = Data Administrator
DBA = Database Administrator
Mgr = Manager
Supv = Supervisor

Definitions

R = Responsible = Accountable for providing approved funding and personnel resources to successfully execute a data management activity. Accountable for budget expenditures and the decisions and performance of the project lead. Bears overall managerial accountability for success of data management activities.

L = Lead = Accountable for successful execution of an approved data management project or activity, within the time, cost, and staffing constraints contained in project planning documentation. Accountable for periodic reporting and progress assessments. Accountable for the quality of the product and for ensuring adequate coordination and consultation with affected parties inside the BLM and external to the Bureau.

S = Support = Provides assistance to the data management activity at hand per agreement with the Lead. Typical support tasks may include, among others, the following:

- Participate in the team, for planning, analyzing, writing, presenting, and documenting the project/activity;
- Review team products;
- Advise the team on subject matter issues and other areas of expertise, and
- Coordinate within and external to the BLM (e.g., National Data Administrator coordinates with, but does not direct, a State data standard effort.)

Roles and Responsibilities to Support Data Management in the BLM

	Develop/Issue Bureau Data Policy	Evaluate Data Management Practices in BLM	Develop Bureau Strategic Data Plans	Develop Bureau Data Standards	Develop State/Center Data Standards	Implement Data Standards	Create Business Rules	Implement QA/QC Processes/ Procedures and Evaluate Data Usefulness	Develop and Implement State/Center Data Policy and Strategic Plans	Create and Maintain Metadata (FGDC Spatial and Alpha-numeric)	Manage Metadata (FGDC Spatial and Alpha-numeric)	Manage FGDC Spatial Metadata Node	Manage User Access and Database Security	Establish Data Sharing Agreements	Administer Data Management Program Training	Manage Data Store Infrastructure	Manage Bureau Data Architecture	Determine Data Requirements	Apply Best Management Practices for Data to Projects	Conduct Data Modeling/Data Analysis (define data entities and relationships between data entities)	Manage Data Documentation	Prepare/Develop/Implement Procedures for Archiving, Backing Up and Restoring Data	Install and Support the RDBMS and Client Software	Provide Adequate Resources for Data Management	Accountable for Data Content	Accountable for integrity/quality of business data they create/update	
NATIONAL ROLES																										
Assistant Director	S	S	S	S		S	S	S		S	S	S	S	S	S	S	S	S	S	S	S	S	S	R		R
CIO	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	R		R
IRM Advisor/ Portfolio Mgr	S	S	S	S		S	S	S						S			S	S	S					S		R
Records Administrator				S			S							L												R
BLM Data Administrator	L	L	L	S		S	S	S		S		L		S	L	S	S	S	S	S				S		R
Program Lead	S		S	S		S	S	S							S				S					S		R
Data Steward	S		S	L	S	S	L	S							S				S					S		R
SCO Data Manager	S	S	S	S		S		S		S	S	S				L	L	S	L	S	L			S	R	R
Data Architect (Modeler)		S		S		S	S	S		S	S	S				S	S	S	S	L	S					R
Data Analyst		S		S		S	S	S		S	S	S				S	S	S	S	L	S					R
Group Manager/Supv	S			S		S	S	S		S				S	S				S					S	R	R
Project Manager						S	S	S	S	S								L	S	S	S			S	R	R
STATE/CENTER ROLES																										
Director/Supv				S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	R	R	R
CIO					S	S		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		R
Data Administrator	S	S	S	S	S	S		S	L	S	L	S		S	S	L	S	S	L	L	L			S		R
Database Administrator									S	S	S		L						S				L	S	S	R
Program Lead				S	S	S	S	S	S	S				S	S			S	S						S	R
Data Steward				S	L	S	L	L	S	S				S	S			S	S						S	R
Data Architect (Modeler)						S	S	S	S							S	S		S	L						R
Data Analyst						S	S	S	S							S	S		S	L						R
System Administrator													L										S	L		R
Records Administrator					S		S		S					L									S			R
GIS Manager	S	S	S	S	S	S	S	S	S	S	S	S		S		S	S	S	S	S			S		S		R
Project Manager						S			S	S								L	S	S					S		R
Resource/Program Specialist					S	L	S	S	S	L		S		S				S	S						S		R
Resource/GIS Specialist	S		S		S	L	S	S	S	L		S							S	S					S		R
FIELD OFFICE ROLES																										
Manager/Supv				S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	R	R	R
Program Lead				S	S	S	S	S	S	S					S			S	S					S		R
Data Admin/DBA					S	S		S	L	S	S		L	S	S			S	S	S	S	L	S			R
Data Steward				S	S	S	L	S	S	S				S	S			S	S							R
Project Manager						S			S	S								L	S	S				S		R
Resource/Program Specialist					S	L	S	S	S	L		S		S				S	S					S		R
Resource/GIS Specialist	S	S	S	S	S	L	S	S	S	L		S						S	S	S				S		R

L=Lead Responsibility
R=Responsible
S=Support

Appendix G- Skills and Training Guidelines for Data-Related Roles

Knowledge/Skills/Ability	Training Required	Role	Level
Knowledge of basic data management principles	BLM course on data basics	All	Overview
Knowledge of Data Administration responsibilities in BLM	Data Administration	CIO/Group Mgr/FO Mgr/GIS Spec/GIS Mgr/ IRM Advisor/ Portfolio Manager/Program Lead/FO DA-DBA	Overview
Familiar with data modeling and analysis (conceptual familiarty)	Data modeling	Data Administrators, GIS/Spec/GIS Mgr/FO DA/DBA.	Overview
Data Quality principles and concepts	Data quality overview	Data Spec/Data Administrators/ Resource Spec/GIS Specialists/GIS Mgr/IRM Advisor/ Portfolio Manager/Program Lead/FO DA-DBA	Overview
Data repository management	Data repository training	Data Specialist	Overview
Knowledge of RDBMS concepts	RDBMS Basics	Data Specialist/Field DA-DBA	Overview
Knowledge of data architecture principles	Federal Enterprise Architecture Framework, Bureau Enterprise Architecture	Data Specialist	Technical
Data modeling	Data Modeling	Data Specialist/Field DA-DBA	Technical
Application of data architecture principles	Strategic Enterprise Modeling	Data Specialist, Database Admin.	Technical
Metadata management	Metadata management	Data Spec/GIS Mgr/FO DA-DBA	Technical
CASE tool proficiency	Vendor CASE tool class	Data Specialist/Field DA-DBA	Technical
Data integration skills (to convert, import/export, combining, and comparing data)	Process and Data Integration	Data Specialist/Field Office DA-DBA	Technical
Data planning and policy formulation	Business Data Management	Data Specialist/ IRM Advisor/ Portfolio Manager	Technical
Data repository management	Data repository tool training	Data Specialist/FO DA-DBA	Technical
Metadata requirements for spatial and alpha numeric data	USGS or in state course on FGDC Requirements class + CMR use	Data Specialist/Data Administrators/ Resource Specialist/GIS Specialist/Field DA-DBA/GIS Mgr	Technical

Knowledge/Skills/Ability	Training Required	Role	Level
Knowledge of how to create data standards, business data requirements and business rules	BLM course on data standards process	Data Stews/Data Spec/IRM Advisor/ Portfolio Manager /GIS Spec/GIS Mgr/Field Office DA-DBA	Technical
Knowledge of Data Administrators responsibilities in BLM	Data Administration	Data Administrators/Data Spec/IRM Advisor/ Portfolio Manager/ Program Lead	Technical
Expertise in data quality procedures	Data quality	Data Administrators/Data Specialist/ Program Leads	Technical
Data management principles and concepts	BLM course on data basics	Data Stews/Data Spec/GIS Spec/ GIS Mgr/Field Office DA-DBA	Technical
Detailed knowledge and skills in relational database management systems (RDBMS), including design, optimization and operation	RDBMS	Database Administrators / Field Office DA-DBA	Technical
Database archiving, back-up and restoration of data	RDBMS-data storage and retrieval administration	Database Administrators/ Field Office DA-DBA	Technical
Database security and access	RDBMS	Systems Administrators	Technical
RDBMS skills and SQL programming skills	RDBMS and SQL	Data Specialist/Field Office DA-DBA	Technical
Knowledge of XML concepts	XML basics	IRM Advisor/ Portfolio Manager GIS Mgr/GIS Spec/Data Spec/Field DA-DBA	Overview
XML Standards and Technology	XML specifics and vocabularies	GIS Mgr/GIS Spec/Data Spec/ Field DA-DBA	Technical

Data Specialist = Data Administrators, managers, architects and analysts
Overview = High-level knowledge
Technical = Demonstrated competency

Appendix H - Roles to Support Data Management in the BLM

Assistant Director (National level – one position per Directorate)
Assistant Directors support data management for the program areas under their jurisdiction.

Responsibilities:
-Ensure resources are available for data management activities for their respective program areas
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Data management principles and concepts

Chief Information Officer (National level - one position)
The Chief Information Officer, or CIO, administers the overall Information Resources Management program.

Responsibilities:
-Provide Bureau-wide policy and direction for its information assets.
-Support and promote the BLM data management program by providing adequate resources for data management in the BLM.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Data management principles and concepts

National IRM Advisors
An Information Resources Management (IRM) Advisor is the Directorate's link to relating Information Technology (IT) issues to the business, and therefore, has a role in supporting data management activities at the national level. The Portfolio Manager may or may not be an IRM Advisor and oversees the Directorate's portion of the BLM's IT Portfolio.

Responsibilities:
-Assist Data Administrators in developing data standards and business rules
-Recommend, develop, and assess the impact of changes to data standards, procedures, guidelines, and documentation as related to a particular project, including metadata standards.
-Apply Bureau data architecture principles
-Designate the appropriate national Data Administrators for their specific activities (in coordination with Group Managers).
-Work with Data Administrators to interpret business needs into applications.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Knowledge of Data Management principles and concepts
Knowledge of Data Administrator responsibilities
Knowledge of Data Architecture principles
Knowledge of XML concepts

Records Administrator (National level-one position, one per state or center)
Records Administrators are responsible for the Records program at the National, State, or Center levels.

Responsibilities:
-Certify application data through the Official Agency Record Designation and Documentation (OARDD).
-Create and maintain internal and external data sharing agreements.
-Assist in identifying Privacy Act issues and access requirements for Bureau, State, and Center level data standards.
-Support the creation of Business Rules by developing access requirements, archiving, backup, and disposition requirements
-State and Center levels would assist in the function of archiving, backup, and restoring data by developing procedures for the archiving and backup to meet disposition requirements.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Data management principles and concepts

Bureau Data Administrator (National level - one position)
The Bureau Data Administrator is a technical expert with a corporate/national role. He/she promotes data as a valued resource.

Responsibilities:
-Provide information management policy and leadership for the Bureau's data management program.
-Develop Bureau Strategic Data Plans.
-Provide and promote the framework for consistency in scope, meaning, and handling of data across the entire organization.
-Oversee the management of the BLM's corporate metadata, including the Federal Geograhpic Data Committee node; to support the organization's data related goals and objectives.
-Oversee procedures and processes to ensure timely, accurate, and shareable data across diverse program areas and organizations.
-Serve as the Bureau's representative on national data standards boards and committees.
-Evaluate the Data Management program and State practices and provide yearly report to the Bureau Chief Information Officer (CIO) (Section 515 report).
-Oversee compliance to data standards.
-Coordinate data sharing and data management activities across functional business areas.
-Provide Data Management training program.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Knowledge of Data Administrator responsibilities
Knowledge of XML concepts

Abilities/Skills Required:
Data planning and policy formulation
Data modeling and data repository management
Data management principles and concepts
Metadata management
FGDC requirements for spatial metadata
Data Quality principles and concepts

Program Lead (one per organizational unit at any level)
Program Leads have one or more Data Administrators in their organizational unit; and are responsible for ensuring that funding for approved standards efforts or any other sanctioned data activity is allocated and protected from diversion.

Responsibilities:
-Actively support Data Administrators in creating, implementing and enforcing all data management activities.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Data Management principles and concepts
Designated resource programs

National Data Administrator (one per business subject area at the national level)
National Data Administrators are experts for their respective business subject area (e.g. geothermal, forestry, wild horse and burros, soils). The National Data Administrator is responsible to ensure that new standards, as well as all modifications of standards, are supplied to the SCO Data Management Branch for incorporation into the Corporate Metadata Repository.

Responsibilities:
-Create data standards and business rules. Follow formal established process.
-Responsible for developing data requirements, standards, access rules, business rules, data quality, and other data activities on a national level for their subject area of expertise.
-Ensure the content and accuracy of automated data is representative of the BLM's policies and procedures.
-Lead data standard development projects for his/her subject area; and maintain a consensus list of priorities for standards development. Support state standards efforts.
-Coordinate data sharing and data management activities across functional business areas.
-Participate in committees supporting data consistency within the agency and among our data sharing partners.
-Disburse data findings and documentation to the states and work closely with State Data Administrators.
-Ensure new data standards, changed data standards, and common data elements are recorded in the Corporate Metadata Repository.
-Accountable for integrity and quality of business data personally created/updated.

Abilities/Skills Required:
Knowledge of basic data management principles and concepts
Knowledge of how to create data standards, business data requirements and business rules through following the nationally established formal process.
Ability to lead and coordinate Data Administratorship program in BLM
Expertise in coordination and communication (internal and external)
Expertise in data quality procedures
Familiar with data modeling and analysis to the data element level
Skill in applying metadata requirements (including geo-spatial and alphanumeric)

System Coordination Office (SCO) Data Manager (national level- one position)

The System Coordination Office Data Manager represents the operational data management activities at the national level.

Responsibilities:
-Responsible for management of the Corporate Metadata Repository (CMR), which includes metadata documentation of all national applications, documentation of all official data standards, business rules, and change management.
-Responsible for the Data and Applications parts of the Bureau Enterprise Architecture.
-Ensure all data models are documented in an accessible location.
-Maintain the Data Architecture.
-Review business cases and other parts of the project life cycle for data requirements as outlined in the Best Management Practices for Data in Projects.
-Provide Project Managers with a data analysis of relevant and common data elements to be used in their projects.
-Assist Project Managers in other aspects of data requirements.
-Manage data store infrastructure.
-Support data standards efforts by researching the CMR, reviewing proposed standards for completeness, and CMR requirements.
-Accountable for all aspects of data within their program or geographic area. Includes responsibility for quality, accessibility, completeness, timeliness, accuracy, and standards.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Project Management skills
Knowledge of XML concepts

Abilities/Skills Required:
Data planning and policy formulation
Data modeling and data repository management
Data management principles and concepts
Metadata management
Data Quality principles and concepts
Knowledge of data architecture

Group Manager/Supervisor (National level – multiple positions)
Group Managers/Supervisors in the WO are responsible for all aspects of their respective programs.

Responsibilities:
-Designate the appropriate national Data Administrators for their specific activities.
-Determine what data will be maintained consistent with the objectives of the BLM.
-Ensure resources are available for data management activities for their respective program areas.
-Accountable for all aspects of data within their program or geographic area. Includes responsibility for quality, accessibility, completeness, timeliness, accuracy, and standards.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Data management principles and concepts
Knowledge of Data Administratorship responsibilities

Project Manager (one position per project, all levels)
A Project Manager leads an individual land use plan project, plan amendment project, IT Investment Project, or any other type of recognized project driven by a BLM business need.

Responsibilities:
-Provide oversight during development of projects to ensure the data needs and requirements are documented.
-Ensure adherence to Bureau requirements for metadata and data standards.
-Implement the Best Management Practices for Data in Projects.
-Accountable for all aspects of data within their program or geographic area. Includes responsibility for quality, accessibility, completeness, timeliness, accuracy, and standards.
-Accountable for integrity and quality of business data personally created/updated.

Abilities/Skills Required:
Knowledge of basic data management principles and concepts

State/Center Director, DSD, Supervisor (multiple positions per State or Center)
The State or Center Director, DSD, and supervisor is responsible for the Data Administration and Data Resources Management programs within their jurisdiction. They also promote data as a valued resource.

Responsibilities:
-Ensure the Data Management program is carried out within BLM and Departmental guidelines.
-Determine what data will be maintained consistent with the objectives of the BLM.
-Ensure resources are available for data management activities for their respective program areas. -Appoint and support Data Administrators for their areas of responsibility.
-Accountable for all aspects of data within their program or geographic area. Includes responsibility for quality, accessibility, completeness, timeliness, accuracy, and standards.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Data management principles and concepts

State/Center Chief Information Officer (one position per State or Center level)
The State Chief Information Officer (CIO) administers the Information Resources Management program for each state, which includes many of the data-related positions at the State Office level.

Responsibilities:
-Provide State/Center-wide policy and direction for its information assets.
-Ensure resources are available for data management activities for their respective program areas. -Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Data management principles and concepts
Knowledge of Data Administratorship responsibilities

State/Center Data Administrator (one position per State or Center level)
State or Center Data Administrators are responsible for overall management, design, and documentation of data supporting BLM's mission at the State level.

Responsibilities:
-Provide information management leadership, data modeling expertise, and custodianship of the state data models.
-Implement data policy and Best Management Practices.
-Develop consistent, documented, accessible data, and metadata resources for the State with shareable data across programs.
-Coordinate data sharing and data management activities across functional business areas.
-Serve as representatives on State data standards committees; and support national efforts as required.
-Facilitate data standardization among data sharing partners.
-Document business rules and data standards for their State.
-Manage State data store infrastructure.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Knowledge of relational database management systems (RDBMS), including design
Knowledge of Data Administratorship responsibilities Project Management skills
Knowledge of XML concepts

Abilities/Skills Required:
Data planning and policy formulation
Data modeling and data repository management
Data management principles and concepts
Metadata management
FGDC requirements for spatial metadata
Data Quality principles and concepts

GIS Manager (State level – one position per State)
GIS Managers lead and/or support the development of spatial databases, standards, and metadata at the State level.

Responsibilities:
-Spatial data development.
-Support establishing data sharing agreements.
-Participate in Inter-agency data coordination/data development planning groups.
-Support the creation of metadata.
-Support and/or lead data standards development at the State level.
-Support evaluating data management practices in BLM.
-Support the development of data standards at all levels.
-Support the data store infrastructure.
-Participate in the Bureau Data Architecture activities and help determine data requirements.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Knowledge of spatial databases, data architecture, data standards, and metadata.
Knowledge of XML concepts.

Abilities/Skills Required:
Development of GIS databases, Enterprise GIS architecture, and spatial database infrastructure and technology
Development of spatial data requirements

Staff and team supervision, and contract management
FGDC Metadata development
Development of data standards XML standards and technology

Database Administrator (where needed – multiple positions)
Database Administrators are technical experts with detailed knowledge of database management, design, optimization and operation.

Responsibilities:
-Develop and implement physical data structures in consultation with the Data Administrator.
-Ensure efficient database architecture, security, recoverability and performance of shareable databases to meet multiple needs.
-Accountable for integrity and quality of business data personally created/updated.

Abilities/Skills Required:
Detailed knowledge and skills in relational database management systems (RDBMS), including design, optimization and operation
Database security and access
Database architecture
Database archiving, back-up and restoration of data
Support for RDBMS and client software
XML standards and technology

State Data Administrator (one per business subject area per state)
State Data Administrators are subject matter experts for their respective business subject area as designated by management.

Responsibilities:
-Create data standards and business rules.
-Coordinate within State for QA/QC process and procedures on program data.
-Ensure data is managed as a corporate resource.
-Coordinate field office data management program with the National Data Administrator and State Data Administrator.
-Coordinate data sharing and data management activities across functional business areas.
-Distribute information on Bureau/State data management initiatives to the program specialists.
-Organize data sharing with other entities.
-Review geo-spatial and alphanumeric metadata for completeness and quality (including FGDC).
-Accountable for integrity and quality of business data personally created/updated.

Abilities/Skills Required:
Knowledge of basic data management principles and concepts
Knowledge of how to create data standards, business data requirements, and business rules
Ability to lead and coordinate Data Administratorship program in BLM
Expertise in coordination and communication (internal and external)
Expertise in data quality procedures
Familiar with data modeling and analysis to the data element level
Skill in applying metadata requirements (including geo-spatial and alphanumeric)

Data Architect (where needed – multiple positions)

A Data Architect or Data Modeler is an expert in data modeling and provides support for data and computer systems analysis, and logical database design.

Responsibilities:
-Develop logical data models for database design.
-Assist Data Administrators in developing data standards and business rules.
-Recommend, develop, and assess the impact of changes to data standards, procedures, guidelines, and documentation as related to a particular project, including metadata standards.
-Apply CASE tools and other data software tools to support projects.
-Apply Bureau data architecture principles.
-Accountable for integrity and quality of business data personally created/updated.

Abilities/Skills Required:
Data management principles and concepts
Data modeling and data repository management
CASE tool proficiency
RDBMS and spatial database skills

Data Analyst (where needed – multiple positions)
A Data Analyst is an expert in any type of scrutiny or analysis of the data.

Responsibilities:
-Assist in establishing data business rules and standards documentation in the State or national repository.
-Analyze the logical current projects data against the component of the Architecture for consistencies and use of data standards.
-Work with the state or national repository, analyzing whatever data analysis requests may come in from the field.
-Evaluate project logical data model to identify redundancies and overlaps with the repository and make recommendations to the project.
-Develop programs to extract data for Data Administrators to support QA/QC process. -Conduct analysis to convert data between systems.
-Apply Bureau data architecture principles. -Accountable for integrity and quality of business data personally created/updated.

Abilities/Skills Required:
Data modeling and data repository management
Data management principles and concepts
Data quality principles and concepts
Data integration skills (to convert, import/export, combining, and comparing data)
RDBMS and spatial database skills
SQL programming skills
Geo-spatial analytical skills

System Administrator (where needed – multiple positions)
System Administrators plan and coordinate the installation, testing, operation, troubleshooting, and maintenance of hardware and software systems.

Responsibilities:
-Manage user access and system security.

-Install and support the physical RDBMS and client software.
-Accountable for integrity and quality of business data personally created/updated.

Abilities/Skills Required:
Database security, access and archiving

Resource/Program Specialist (where needed – multiple positions)
The Resource/Program Specialist is a technical expert in Resource discipline technology. This category includes all employees working any functional business area.

Responsibilities:
-Responsible to know resource data requirements, standards, access rules, and training.
-Work with Data Administrators to interpret business needs into applications.
-Facilitate educational opportunities for the treatment, application, and value of spatial data.
-Create and maintain metadata to quality specifications.
-Provide consistent interpretation and application of Bureau/State policies to their respective State Offices.
-Manage databases containing spatial data.
-Implement data standards.
-Accountable for integrity and quality of business data personally created/updated.

Abilities/Skills Required:
Technical expertise in a natural resource or other program
Knowledge of data management principles

Resource/GIS Specialist (where needed – multiple positions)
The Resource/GIS Specialist is a technical expert in a resource subject area discipline and GIS technology.

Responsibilities:
-Coordinate geo-spatial data management (internal and external).
-Implement State/Bureau data standards; and may participate in the development of standards.
-Create/maintain spatial metadata.
-Work with Data Administrators to interpret business needs into GIS applications and derive data requirements.
-Facilitate educational opportunities for the treatment, application, and value of spatial data.
-Provide consistent interpretation and application of Bureau GIS policies to their respective offices.
-Manage databases containing spatial data.
-Research potential data sources.
-Provide input in the evaluation of data management practices.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Data modeling and database design
Knowledge of Resource Program
Knowledge of geodesy
Knowledge of XML concepts

Abilities/Skills Required:
Technical expertise in GIS technology and applications
Graphical map-making skills
Knowledge of data management principles

Conduct geo-spatial analysis
XML standards and technology

Field Manager/Supervisor (multiple positions)
Field Managers at locations all across the Bureau are responsible for all aspects of activities in their jurisdiction.

Responsibilities:
-Ensure resources are available for data management activities for their respective program areas. -Determine what data will be maintained consistent with the objectives of the BLM.
-Accountable for all aspects of data within their program or geographic area. Includes responsibility for quality, accessibility, completeness, timeliness, accuracy, and standards.
-Appoint and support Data Administrators for their areas of responsibility.
-Accountable for all aspects of data within their program or geographic area. Includes responsibility for quality, accessibility, completeness, timeliness, accuracy, and standards.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Data management principles and concepts

Field Office Data Administrator (where needed—multiple positions)
A Field Office Data Administrator is a resource specialist and subject matter expert designated by management.

Responsibilities:
-Coordinate field office data management program with the State Data Administrator and State Data Administrator.
-Coordinate data sharing and data management activities across functional business areas.
-Determine data requirements and business rules.
-Work to ensure data quality.
-Review geo-spatial and alphanumeric metadata for completeness and quality (including FGDC).
-Capitalize on data sharing opportunities at the local level.
-Accountable for integrity and quality of business data personally created/updated.

Abilities/Skills Required:
Knowledge of basic data management principles and concepts
Knowledge of how to create data standards, business data requirements, and business rules
Ability to lead and coordinate Data Administration program in BLM Expertise in coordination and communication (internal and external)
Expertise in data quality procedures
Familiar with data modeling and analysis to the data element level
Skill in applying metadata requirements (including geo-spatial and alphanumeric)

Field Office Data Administrator/Database Administrator (one per field office)
A Field Office Data Administrator/Database is a combined position with some of both skill sets. Database Administrators are technical experts with detailed knowledge of database management, design, optimization and operation. Data Administrators are responsible for overall management, design, and documentation of data supporting BLM's mission at the field office level.

Responsibilities:
-Provide information management leadership, data modeling expertise, and custodianship of the field office data models.
-Implement data policy and Best Management Practices.
-Develop consistent, documented, accessible data, and metadata resources for the field office with shareable data across programs.
-Coordinate data sharing and data management activities across functional business areas.
-Document business rules and data standards.
-Accountable for integrity and quality of business data personally created/updated.

Knowledge Required:
Knowledge of Data Administrator responsibilities
Data management principles and concepts
FGDC requirements for spatial metadata
Knowledge of XML concepts

Abilities/Skills Required:
Data modeling and data repository management
Metadata management
Data Quality principles and concepts
Detailed knowledge and skills in spatial relational database management systems (RDBMS), including design, optimization and operation
Database security and access
Database archiving, back-up and restoration of data
Develop and implement physical data structures
XML standards and technology

Appendix I

Table 1 Roles in Adopting a BLM *National* Data Standard

NATIONAL STANDARD	Propose Data Standard		Adopt Data Standard				Implement Data Standard		Maintain Data Standard		
L = Lead responsibility S = Support R = Responsible C = Consult	Develop Proposal	Evaluate Proposal	Produce Draft Standard Report	Evaluate Draft Standard Report	Prepare Final Standard Report	Adopt Standard	Develop Implement-ation Plan	Execute Implement-ation Plan	Evaluate Data Standard Usefulness	Evaluate Change Request	Revise Data Standard
National Roles											
Assistant Director	R			R		R		R		R	
CIO											
Records Administrator	S	S		S		S	S	S		S	
BLM Data Administrator	S	L		L		L			L		
Data Steward (Team)	L	S	L		L		L	L	S	L	L
SCO Data Manager		S		S		S	S		S	S	
Group Manager	S	S		S		S	S		S	S	
Project Manager											
State/Center Roles											
Director	S			S		S		S		S	
CIO											
Data Administrator	S	S	S	S	S	S		S	S		S
Database Administrator			S		S		S	S		S	S
Data Steward (Team)	S	S		S		S	S	S	S	S	
Data Architect (Modeler)			S								
Data Analyst								S	S		
System Administrator											
Records Administrator	S			S		S	S	S		S	
Project Manager											
Resource/Program Specialist	S	S		S				S	S	S	
Resource/GIS Specialist	S	S		S				S	S	S	
Field Office Roles											
Manager	S			S		S		S		S	
Data Steward (Team)	S	S		S		S	S	S	S	S	
Project Manager											
Resource/Program Specialist	S	S		S				S	S	S	
Resource/GIS Specialist	S	S		S				S	S	S	

Table 2 Roles in Adopting a BLM *State* Data Standard

STATE STANDARD	Propose Data Standard		Adopt Data Standard				Implement Data Standard		Maintain Data Standard		
L = Lead responsibility S = Support R = Responsible C = Consult	Develop Proposal	Evaluate Proposal	Produce Draft Standard Report	Evaluate Draft Standard Report	Prepare Final Standard Report	Adopt Standard	Develop Implement-ation Plan	Execute Implement-ation Plan	Evaluate Data Standard Usefulness	Evaluate Change Request	Revise Data Standard
National Roles											
Assistant Director											
CIO											
Records Administrator				S		S					
BLM Data Administrator				S		S			S		
Data Steward (Team)	S	S				S	S		S		
SCO Data Manager		S		S		S	S			S	
Group Manager				S							
Project Manager											
State/Center Roles											
Director	R			R		R			R		
CIO											
Data Administrator	S	L	S	L	S	L		S	L	S	S
Database Administrator			S		S		S	S			S
Data Steward (Team)	L	S	L	S	L	S	L	L	S	L	L
Data Architect (Modeler)			S								
Data Analyst								S	S		
System Administrator											
Records Administrator	S	S		S		S	S	S			
Project Manager	S			S		S			S		
Resource/Program Specialist	S	S		S			S	S	S	S	
Resource/GIS Specialist	S	S		S			S	S	S	S	
Field Office Roles											
Manager											
Data Steward (Team)	S	S		S		S	S	S	S	S	
Project Manager											
Resource/Program Specialist	S	S		S			S	S	S	S	
Resource/GIS Specialist	S	S		S			S	S	S	S	

Table 3 Roles in Adopting a BLM *Field* Office Data Standard

LOCAL STANDARD	Propose Data Standard		Adopt Data Standard				Implement Data Standard		Maintain Data Standard		
L = Lead responsibility S = Support R = Responsible C = Consult	Develop Proposal	Evaluate Proposal	Produce Draft Standard Report	Evaluate Draft Standard Report	Prepare Final Standard Report	Adopt Standard	Develop Implement-ation Plan	Execute Implement-ation Plan	Evaluate Data Standard Usefulness	Evaluate Change Request	Revise Data Standard
National Roles											
Assistant Director											
CIO											
Records Administrator				S		S					
BLM Data Administrator				S		S					
Data Steward (Team)	S	S				S	S				
SCO Data Manager		S		S		S	S			S	
Group Manager				S							
Project Manager											
State/Center Roles											
Director	S			S		S				S	
CIO											
Data Administrator	S	L	S	L	S	L		S	L	S	S
Database Administrator			S		S		S	S			S
Data Steward (Team)	S	S	S	S	S	S	S	S	S	S	S
Data Architect (Modeler)			S								
Data Analyst								S	S		
System Administrator											
Records Administrator	S	S		S		S	S	S			
Project Manager											
Resource/Program Specialist	S	S		S			S	S	S	S	
Resource/GIS Specialist	S	S		S			S	S	S	S	
Field Office Roles											
Manager	R			R		R				R	
Data Steward (Team)	L	S	L	S	L	S	L	L	S	L	L
Project Manager											
Resource/Program Specialist	S	S		S			S	S	S	S	
Resource/GIS Specialist	S	S		S			S	S	S	S	

Appendix J Data Standard Template

DATA STANDARD PROPOSAL

PART I. GENERAL INFORMATION:

Name of Requestor:	Date of Request:
Name of Requested Data Standard:	Data Affected:

What purpose will this data standard serve (describe need, intended use)?

Who will perform this work, and in what FY(s)?_____

When will the work begin, and when do you expect to finish (fill in approximate dates below)?

Major Milestone	Month/Year
Obtain Approval to Proceed	
Appoint Team Lead and Form Team	
Review Draft Data Standard	
Submit Final Data Standard	
Obtain Final Approval (Target Date)	

About how many work-months of effort (BLM and contractor) will be required?

Does this data standard affect sensitive data (financial, business proprietary, cultural resources, Privacy Act, etc)? ____ Yes ____ No

If yes, what standard or directive governs access and protection?

PART II: INFORMATION ABOUT THE DATA STANDARD:

List and summarize the data that this data standard will affect:

Data Subject Area	Description

Which Data Administrators (National and/or State) are participating?
_____
_____

Does this data standard govern data in an existing or proposed automated system?

_____ Yes _____ No

If yes, which one(s)? _____

Is this system operational? If not, when will it be? _____

Have the system owner, Data Administrator, and project manager been consulted? _____ Yes
_____ No

Have users of data affected by this standard been consulted? Please describe coordination to date:
_____

_____

What are the main workload and budget impacts anticipated when this data standard is implemented (include BLM programs, public and other users)?

Affected Party	What is Affected?	What is the Magnitude of Impacts (Time, Costs, Staffing)?

Are there existing data standards for this data, or standards that could be extended for this purpose? Check with:

The national and/or state Data Administrators

Local GIS Coordinator

Corporate Metadata Repository

FGDC Geospatial Metadata Repository

State Data Dictionary for existing data attribute standards

Data Management Intranet web site

State or Field Office data standard: ____ Yes ____ No

BLM national data standard: ____ Yes _____ No

Industry data standard: ____Yes _____ No

Data Quality Specification:

Will this data standard include a specification of data quality requirements? Please summarize:
_____

AUTHORIZATION:

Prepared By: _____ _____
Requestor Date

Reviewed By: _____ _____
National Data Administrator Date

Reviewed By: _____ _____
Bureau Data Administrator Date

Approved By: _____ _____
Sponsor Date

Appendix K – Data Standard Report

DATA STANDARD REPORT

Format and Content

1. Introduction – This section provides general information about the data standard**.**

- **a. Description of Standard** – Describe the type of data being covered by this data standard. Is the data spatial or non-spatial? What are the topic areas that are covered by the standard?
- **b. Affected Groups** - Who is affected by the standard, or, who should care about the standard? Who is the sponsor of this standard?
- **c. Sponsor** – who will be the business sponsor of this standard adoption effort?

2. Data Category – link to BEA – How does this standard fit into or support the BEA? What data subject area within the Architecture does this standard fall into?

3. Data Administrator Identification (including lead agency if appropriate) – Who is the Data Administrator for the data described in this standard? Multiple Data Administrators may be involved if the standard addresses more than one topic area (for instance, there may be different Data Administrators for birds and mammals yet they may both be addressed in one data standard). However, it will always be required that one appropriate Data Administrator be in overall charge of each standard adoption effort. This normally would be the National Data Administrator for Bureau-wide data standards, a State Data Administrator for State data standards. If another agency has the recognized lead for a topic area then that agency and the appropriate Data Administrator within that agency should be identified.

4. Data Set Characteristics – This section identifies the characteristics of the data set as a whole.

- **a. Overall Security** – Identify the security (public/non-public) level of the data set. If non-public, identify why the data is considered non-public (e.g. contains cultural resource locations). Identify who (individuals, groups, public) will be granted “Create, Read, Update, and/or Delete” privileges.

- **b. Data Collection and Maintenance Protocols** – Identify any data collection and maintenance procedures that would apply to this data set (no matter how the data is being used or no matter what application is accessing/using the data).
  - **i. Accuracy requirements –** What level of accuracy is required by the subject matter specialists? If the standard is dealing with spatial data then this may also include issues such as scale and spatial accuracy. This is closely tied to the next section on collection and input protocols.
  - **ii. Collection and input protocols** – What are the approved methods for collecting and entering the data? (Citation of source is sufficient.)
  - **iii. Update Procedures -** Identify any special update procedures that may relate to the (such as issuance of annual bills) then that should be identified in the data standard. data standard. For instance, will updates be done on a case file basis, township basis, field office basis? How often will updates be accomplished, once a month, once a year, overnight? This may also identify the update requirements, such as whether a database needs to be accurate as of a certain date.

c. Data Quality – Describe data quality measure that will be applied to the data, either during data entry/edit or in some other manner.

i. Transaction level data quality - What data quality measures are put in place to maintain quality during data entry/edit?

ii. Monitoring level data quality - What kind of systematic review of data quality will take place and how will it be done?

d. Relationship to Other Standards - Identify any other data standards that are related to this standard in some way. This may be a standard on a similar topic, one that sets umbrella standards that this one must meet, etc. An example may be a state or local standard that is an extension of a national standard.

5. Data Model Characteristics – Each data standard is to be supported by a data model. Data models contain more than just a "picture" of the data set. It also contains details about the entities and relationships between those entities.

a. Schema (graphic) – A graphical depiction of the data described by this data standard. For the purposes of the data standard, only a logical data model is required. This shall conform to the formats, nomenclature, and definitions in the BEA enterprise logical data model, and shall be mapped to the lowest level provided in that model.

b. Entity Descriptions – Descriptions of the places, persons, things, concepts that are described by the data set.

i. Structured data element names – Use the BLM structured data element naming convention (entity modifier(s) classword) to name all data elements (attributes) that are part of the entity.

ii. Data element definitions – Provide definitions of each data element that are clear, complete and free of jargon. Include the attributes of the data element as part of the definition, and avoid using the data element name to define itself.

iii. Field size/data type - Identify the field size (number of characters, number of digits, etc) necessary to hold the information for this data element. Also identify the type of data this element contains (character, integer, date, etc).

iv. Domain codes and definitions – If the data element contains codes then list and define all codes or refer to another authoritative source for the codes.

v. Entity/Data element security - Security considerations (public/nonpublic) for individual data entities and data elements.

vi. Data Administrator - Identify the Data Administrator for each entity and data element (if different Data Administrators are responsible for portions of the entity).

c. Relationships between Entities - Identify how the different entities represented in the data model relate to each other.

d. Business Rules – The business rules under which the data is used and modified.

6. Other Material - Any other supporting material that aids in the understanding or use of the data standard. This must include specific geographic, organizational, or applicability constraints for non-national standards.

Appendix L – Sample Data Standard Report

Sample Data Standard
[Modified Version for Example Purposes Only—Do Not Use]
Wildlife Observation Data Standard

1. Introduction

a. Description of Standard – This standard governs all wildlife observation data collected for the purpose of managing wildlife resources on lands for which the BLM is responsible. This standard addresses observed physical characteristics like identification, age classification, and activity, and information regarding the location and method of observation. This data is used to derive things like 'crucial winter ranges for a given species' or 'nesting territories of a given species.' This standard will enhance wildlife management by allowing standardized wildlife information to be combined with other resource information when deriving land management recommendations.

b. Affected Groups - This standard directly affects field biologists and technicians who observe and tag wildlife, and who record other data concerning wildlife populations. GIS technical support staff and data administrators will participate in the management and use of data stored in accordance with this standard.

c. Sponsor - This standard is sponsored by the Deputy State Director, Alaska Division of Lands of Resources.

2. Data Category – link to Bureau Enterprise Architecture – This standard addresses the BEA High-Level Data Subject Area "Environmental Interests."

3. Data Administrator Identification (including lead agency if appropriate) –

TITLE	NAME	PHONE NUMBER	EMAIL ADDRESS
State Data Administrator	Jeff Denton	(907) 267-1233	Jeff_Denton@ak.blm.gov
National Data Administrator	Cal McCluskey	(208) 452-7761	Cal_Mccluskey@blm.gov
State Data Administrator	Linda Ricketts	(907) 271-4645	Linda_Ricketts@ak.blm.gov
GIS Technical Support	Ralph Falsetto	(907) 267-1229	Ralph_Falsetto@blm.gov

4. Data Set Characteristics – This section identifies the characteristics of the wildlife observation data as a whole.

a. Overall Security – This data is to be accessible to the wildlife biologists and their staff members to whom they have granted access to this database. This data base may contain sensitive information that might be withheld under the Freedom of Information Act. "Create, Read, Update, and/or Delete" privileges will be granted to appropriate personnel of BLM Alaska by the State Data Administrator for this data, who will ensure that these privileges are reviewed and updated regularly.

Access and security rules for the wildlife observation data are specified in metadata. These are enforced by the Wildlife Observation System software application, and assurance of similar enforcement must be provided if the data are collected or manipulated using other software. The user id and date are collected for all transactions performed within the Wildlife Observation System. This provides an audit trail to identify and correct any intentional or unintentional security occurrences.

b. Data Collection and Maintenance Protocols –

i. Accuracy requirements –

A wide range of positional accuracy is acceptable for locations of wildlife observations. Observations range from GPS locations to sightings marked manually on 1:63,360 topographic maps. Minimum accuracy should therefore correspond to National Map Accuracy Standard. Each of the *methods* for collecting location information will be documented. There are data elements to accommodate the following location designators: latitude and longitude of a point, legal land description, UTM measurements and polygon id.
The observation method, observing agency, observer's name, date and project data elements can all be used to differentiate varying levels of accuracy so that lower quality data can be excluded from a particular analysis if appropriate.

ii. **Projection and Datum**

Features are stored in Geographic coordinates (latitude and longitude) using the North American Datum, 1983(NAD 83). Since source data can be in a variety of coordinate systems, the data collection system must convert coordinates to NAD 83 prior to storage.

iii. **Precision**

Storage Precision - All coordinates are stored using double precision. Features also are stored as double precision points.

Collection Precision - Due to the nature of wildlife observations and the varying means of determining the location, collection precision is allowed to vary based on method of observation and the observers experience. The most precise locations will be from GPS, while the least precise are acknowledged to be from marked location on topographic maps

iv. Collection and input protocols – The Wildlife Observation System (WOS) software application can be used to structure and simplify data input. Using WOS also helps to ensure that wildlife observation data are input correctly, in conformance with this standard. WOS is a 4GL application that employs the Informix□ Relational Database Management System (RDBMS) for data storage and access, and provides geospatial display and query via an ArcView□-based mapping tool. Data also may be collected using other aides and software tools, so long as it conforms to this standard. For example, portable collection devices (Personal Digital Assistants, etc.) can be programmed to collect data in a format that enforces conformity to this standard.

v. Update procedures - Each Field Office Data Administrator is responsible to ensure that data are collected in strict conformity to this standard. Update of all data will occur continuously, as new observations are obtained and entered into the wildlife observation data base by field biologists and technicians.

c. Data Quality –

i. Transaction level data quality - Quality control at the time of transactions has two aspects. Conformity to valid domains and business logic must be ensured with any method of collection. When the Wildlife Observation System software is used, these are enforced automatically for all data elements. For example: if the "species observed" is a *Brown/Grizzly Bear,* the valid "Activity" selection could not include "*flying*". In addition to data type and field length, business rules specifying mandatory entries and valid values are enforced for many data elements. The second type of quality control at transaction time is procedural. Each new record will be visually reviewed and approved by a second qualified person on a continuing schedule, to be agreed with the State Data Administrator for this data. Valid domain values and business logic are maintained by the State Data Administrator. If another software tool is used for data collection, please contact the State Data Administrator for a current list of the domain values and business rules. These are independent of software applications that may be used to store or analyze the data, and must be enforced by automated or procedural methods, in order to protect the integrity of the wildlife observation database.

ii. Monitoring level data quality – Monitoring-level quality assurance involves a periodic evaluation across the full extent of the wildlife observation data base. The State Data Administrators, in conjunction with the District Data Administrators, are responsible for reviewing the data at least once per year to assure that established protocols are being followed in the creation and maintenance of the data. In addition, the State Data Administrators will schedule and lead periodic assessments of the quality and completeness of this data, following current BLM guidance on data quality evaluation and reporting methods.

d. Relationship to Other Standards – This standard is related to a number of standards that govern the valid values for some attributes:

The standard for:

Vegetation: L. A. Veireck et. al.. 1992. The Alaska Vegetation Classification. U.S.D.A. Forest Service, Pacific Northwest Research Station. General Technical Report PNW-GTR-286. July 1992. 278pp.

Mammals: Wilson, D. E. and D. M. Reeder, eds. 1993. Mammal species of the world: a taxonomic and geographic reference. Second Edition. Smithsonian Institute Press, Washington, DC 1206pp.

Birds: Seventh Edition (1998) of the American Ornithologist's Union (AOU) Check-list of North American Birds, the 42nd supplement (2000) to the Checklist.

Amphibians:

1. Banks, R. C., R. W. McDiarmid, and A. L. Gardner, eds. 1987. Checklist of Vertebrates of the United States, the U. S. Territories and Canada. U.S.D.I. Fish and Wildlife Service. Resource Publication 166. Washington D. C. 1987. Pages 3-9.

2. Hodge, R. P. 1977. Amphibians and Reptiles in Alaska, the Yukon, and Northwest Territories. Alaska Northwest Publishing Co.

Reptiles: Banks, R. C., R. W. McDiarmid, and A. L. Gardner, eds. 1987. Checklist of vertebrates of the United States, the U. S. Territories and Canada.
U.S.D.I., Fish and Wildlife Service. Resources Publication 166. Pages 10-21.

FGDC compliant Metadata:
Metadata that complies with the Federal Geographic Data Committee's Content Standard for Digital Geospatial Metadata is required for the spatial component of the Wildlife data.

[Please note: The above list of standards is not complete, but is representative of the standards that affect the wildlife standard. A complete standard should list all related standards.]

5. Data Model Characteristics –

a. Data Model (Schema) -- Figure 1 presents the logical data model for this standard, which defines all data entities and the logical relationships among them. Data elements (attributes) are shown within the rectangle of each data element. Please confer with your State Data Administrator concerning any questions you may have regarding this data model.

b. Data Element (Attribute) Descriptions -- Pages following the logical data model present, for each of the 19 data entities, the definition, security status, any applicable business rules. Data elements (attributes) then are listed and defined. (See Table 1.) *[Three examples are provided. Please note that data element naming must conform, as do these examples, to guidance provided in I.M. 2001-029, "Data Management Interim Guidance"]*

http://www.blm.gov/nhp/efoia/wo/fy01/im2001-029.html

Appendix M - Data Standard Implementation Plan

Data Standard Implementation Plan Report

Data Standard Implementation Plan					**Date:**
Data standard Level : ___ National __State/Center __Field			Data Standard to Implement:		
Data Set/Element to be Modified :					
Data Administrator (Responsible Lead):					
Group Manager (Responsible over Data Administrator):					
Target Date for Implementation:					
Role	Implementation Tasks Assigned:			Start Date	Completion Date
Data Administrator (Lead)					
Data Administrator					
Records Administrator					
SCO Manager					
Database Administrator					
Data Analyst					
Resource /Program Specialist					
Resource/GIS Specialist					
Implementation Completion Dates: (Tailor these column headings to your project. However, arrange steps in order of priority to the business.)					
Data Element/Set	Lead	Start Date	Planned End Date	Actual End Date	Special Considerations

Appendix N - ACRONYMS

ABC	Activity Based Costing
ANSI	American National Standards Institute
BEA	Bureau of Land Management Enterprise Architecture
BEAR	Bureau of Land Management Enterprise Architecture Repository
BLM	Bureau of Land Management
BPR	Business Process Re-engineering
CDE	Common Data Element
CIO	Chief Information Office/Chief Information Officer
CMAT	Corporate Metadata Advisory Team
CMR	Corporate Metadata Repository
COTS	Commercial of the Shelf
DM	Data Management
DOI	Department of the Interior
DRM	Data Resource Management
EPAP	Employee Performance Appraisal Plan
FGDC	Federal Geographic Data Committee
FIPS	Federal Information Processing Standards
FOIA	Freedom of Information Act
GIS	Geographic Information System
GOTS	Government off the Shelf
IEC	International Electrotechnical Commission
IM	Instruction Memorandum
IRM	Information Resources Management
ISO	International Organization for Standardization
IT	Information Technology
ITIB	Information Technology Investment Board
ITIM	Information Technology Investment Management
JAD	Joint Application Development
NTC	National Training Center
OARDD	Official Agency Record Designation Document
OMB	Office of Management and Budget
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
SCO	System Coordination Office
SME	Subject Matter Expert
SMMS	Spatial Metadata Management System
WO	Washington Office
XML	Extensible Markup Language

Data Management

Glossary of Terms

Access – The ability to view, inspect, or copy Bureau records.

Access Rights – The permissions on the computer that allow the user to read, write, update, and delete data.

Attribute – A property or characteristic of an entity (also referred to as a data element or data item).

Authority – Law, decision, etc. (e.g. Public Law, Executive Order, Congressional Act, Code of Federal Regulations) Automation restriction - These are often referred to as 'legacy artifacts'. Often, business rules (e.g. date editing, field types, field lengths, field domain values) are the result of some limitation or requirement of the technology used. These types of rules are often carried forward into new systems because of the difficulty of conversion.

Baseline – A set of critical observations or data used for comparison or control of a system

BEA – Initials designating the Bureau Enterprise Architecture, which models the way that the organization currently operates

BPR – A Bureau Enterprise Architecture term for Business Process Reengineering, which is a tool to analyze and design streamlined workflows to improve efficiencies in business processes

Business Requirement – A Business Requirement is anything that describes the financial, marketplace, or other business benefit that either customers or the business can gain by means of a particular product or process.

Business Rule – Business Rules are statements of policy, procedures, and guidelines that define or constrain an aspect of the business and provide the structure for conducting BLM business. (Note: I think we should provide a simple example here, if there is one).

Business Terms – word or phrase that has a specific meaning for the business in some designated context (e.g. case, plan, assessment, state, county, customer)

CMR – Corporate Metadata Repository for BLM national and major state system metadata

Comparate Data – Data that are alike in kind, quality, and character and are without defect

Comprehensive Data Definitions – Comprehensive data definitions are clear, precise and robust definitions of data. This includes defining the meaning of business terms, entity types, and attributes. Two Instruction Memorandums describe the policy. Instruction Memorandum 2003-134, Capturing Information about the Bureau of Land Management's Data Resource) establishes the requirement to capture and store information about data. Instruction Memorandum 2003-125, Procedures for Adopting and Managing Data Standards, establishes the requirements to provide clear, complete and jargon-free definitions of data elements as part of the data standards development process.

Computer Application – A computerized software tool that stores and manipulates data (e.g. RIPS, LR2000, FPPS, Oil and Gas Sale Database)

Confidential/Proprietary records – Information submitted to the Government in expectation of confidentiality, the release of which would result in substantial competitive harm to the submitter. Example: Trade Secret = a secret, commercially valuable plan, formula, process or device that is used for the making, preparing, compounding, or processing of trade commodities and that can be said to be the end product of either innovation of substantial effort.

Corporate – Data used by or for the BLM, which is considered the property of the BLM. Also refers to data that is used statewide or at least by more than one office.

Data – symbols representing facts, ideas, or values which may be processed to produce information

Data Administration – The high level function with the BLM of planning, coordinating, and managing BLM's corporate data resource to meet existing and future data and information needs.

Data Administrator – Person in the organization who acts as the focal point for planning for, developing, managing and operating the office's corporate data

Data Collection - Data collection is the process of capturing the data that BLM needs to meet a business need.

Data Element – The smallest unit of data that has meaning in processing information. Also called a data item or data attribute. Data elements describe a data entity.

Data Integrity – A measurement of how well data is maintained in the data resource after it is captured or created.

Data Management – The process and procedures required for all data BLM collects or acquires.

Data Mining – The analysis of historical data to identify unknown or unsuspected trends and patterns in the business.

Data Model – A data model is a set of diagrams and definitions that represents the enterprise data and their interrelationships in a specific and consistent way. It is a definition of the structure, rules, and constraints on data required by an enterprise to conduct all of its business functions. The data model contains entities, attributes, relationships, primary and foreign keys, and rules governing the data. Data modeling is the practice of analyzing and representing the data in a meaningful fashion, easily understood by nearly anyone in the enterprise.

Data Resource Data – Any data that documents the data resource. It replaces the term metadata

Data Sharing – The act of cooperating with other agencies or organizations to lesson the need for the collection of duplicate information.

Data Standard – The rules by which data are described and recorded.

Data Steward – The person most knowledgeable about the resource or program who ensures that pertinent data meets any defined data standards and accurately describes the resource for which

they have responsibility. Data stewards are responsible for manage data with proper regard to the informational needs of others.

Data Subject Areas – The BLM Enterprise Architecture describes the mission of BLM. It is divided into different business areas called Data Subject Areas. The list of these is: Accounts, Administrative Interests, Assessments, Budgets, Cases, Correspondence, Cultural Interests, Documents, Environmental Interests, Facility Interests, Guidance, Hazards, Human Resource Information, Legal Entities, Library Information, Local Community Interests, Locations, and Managed Records. If the data standard does not come under one of these data subject areas, it is probably not within the scope of the Mission of BLM.

Disparate Data – Data that are essentially not alike, or are distinctly different in king, quality, or character. They are unequal and cannot be readily integrated

Entity – A person, place, thing, event, or concept of interest, about which descriptive data is defined, collected, or recorded.

ETL – The acronym for Data extract, transform and load, which is the process for converting or transforming data from one database to another.

FGDC – Federal Geographic Data Committee, a body representing the major federal agencies that generate or use geospatial data.

Foreign Key – The data element in an entity that holds the value found in the primary key of another entity is called a Foreign Key. (e.g., a state code in an address that ties to a STATE CODE REFERENCE entity.)

Formal Data Naming – Formal data naming is the classification of data based on a set of rules determined by using a consistent convention. The benefits to this taxonomy include; readily identified data, limited data disparity, and improved productivity. (Existing Policy – the BLM adopted a data naming convention in Instruction Memorandum 2001-029 which is, in turn, based on guidance in "Guidelines to Implementing Data Resource Management" (published by the Data Management Association).

GCDB – Geographic Coordinate Database

GPS – Global Positioning System

Guidance – methods, practices, directions (e.g. internal and external policies, procedures, directives, software development documents, manuals, handbooks) that provide framework and means to implement the mission, objectives and plans (e.g. Bidders should fill out a bidders form before participating in the auction)

Guidelines – business statements that contain instructions, practices, recommendations that are not always mandatory but are desired (e.g. Best Management Practices, Standard Operating Procedures, technical notes, informational bulletins)

Identifiable Form – In relation to the Privacy Act, this term means that information in an IT system or online collection that directly identifies an individual (e.g., name, address, social security number or other identifying number or code, telephone number, email address, etc.) or by which an agency intends to identify specific individuals in conjunction with other data elements, i.e., indirect

identification. (These data elements may include a combination of gender, race, birth date, geographic indicator, or other descriptors).

ITIM – Information Technology Investment Management

Logical Name – The name of the data element. This naming must follow the conventions used for naming data elements to be correct.

Manual Process – activities done by hand (e.g. accepting a submitted form)

Metadata – Information about data or services such as content, source, vintage, accuracy, responsible party, method of collection, and other descriptions. Usually refers to agreed-upon definitions and business rules stored in a centralized repository so business users – even those across departments and systems – use common terminology for key business terms. Metadata may include descriptive information about the context, quality and condition, or characteristics of the data.

Metadata Repository – A centralized database that contains metadata. The Bureau repository is the Corporate Metadata Repository (CMR) located at: http://web.blm.gov/CMR/index.htm

Mission – the high level goal or outcome the business goal is meant to achieve (e.g. sustain the health, diversity and productivity of the public lands for the use and enjoyment of present and future generations.)

Model – A model is a representation of something in the real world. It is the process of identifying the activities and describing the data required and placing it in a picture (schematic, graphic) so that it is easily understood.

Naming Convention – A naming convention is a collection of rules, which, when applied to data result in a set of data elements named in a logical and standardized way.

Non-Tabular Data – Any data that are not generally maintained in traditional databases or typically displayed in tabular form, such as spatial, textual, voice, image, and video data

NIFC – National Interagency Fire Center

NILS – The National Integrated Lands System

Objectives – statement of attainable, time sensitive, and measurable target or state that the enterprise intends to maintain, sustain, or improve (e.g. rangeland improvements)

Official Agency Records – A designation given to any manual or automated Bureau record that has met all legal and administrative standards of trustworthiness, and could be considered admissible in a Federal court, prior to its use for decision making.

Official Agency Record Status – The process of designating Electronic Records Systems as Official Agency records based on Records Transition planning documentation. Historically, records received and made by the BLM have been manual records and the manual medium (paper) has been designated for BLM's official record copy. With the advent of electronic records systems, designating documentary material as the official agency record becomes more complicated. Since electronic records are more susceptible to undetected alterations, they should not be used in the decision making process until an Official Agency Record Designation Document (OARDD) has been

completed in accordance with BLM Handbook H-1270-1, Electronic Records Administration. This document will enhance confidence in BLM decisions by substantiating the trustworthiness and integrity of the electronic records.

PDF – Portable Document Format used in Adobe word documents

PIA – Privacy Impact Assessment is an analysis of how information is handled: (1) to ensure handling conforms to applicable legal, regulatory, and policy requirements regarding privacy, (2) to determine the risks and effects of collecting, maintaining, and disseminating information in identifiable form in an electronic information system, and (3) to examine and evaluate protections and alternative processes for handling information to mitigate potential privacy risks.

Physical Name – Names of data elements that are utilized in the software. The names should only be abbreviated to accommodate the particular software system being used. All physical names are linked in the documentation to the Logical data element they represent. Logical names should be used as the physical name where possible.

Plans – documented procedures and tactics for a course of action (e.g. strategic plan, land use plan, work plan). Plans indicate the ongoing operational activity and describes what the business is or will be doing on a day-to-day basis

Precise Data Integrity Rules – Business rules that describe policies governing business actions that specify data integrity requirements that are complete, accurate, and clear.

Primary Key – A primary key is a data element or a combination of data elements that makes the instance of the entity unique (e.g., Social Security Number)

Privacy Act – A law providing protections to people by establishing that no agency shall disclose any record that is contained in a Privacy Act "system of records" by any means of communication to any person or to another agency, except pursuant to a written request by, with the prior written consent to, the individual to whom the record pertains. The Privacy Act also contains limitations on the collection and dissemination of information by federal agencies.

Privacy Act System of Records - A group of any records under the control of any agency from which information is retrieved by the name of an individual or by some identifying number, symbol, or other identifier assigned to the individual.

Proper Data Structure – The design of the data models and databases that house the information resources to support the customers and supports information that is sharable and reusable. The design should provide relevant detail for the target audience. Improper data structures consist of overloaded detail, wrong audience focus, and inadequate business representation. Data structures are designed to encourage reuse, stability, and flexibility of the data model and database design. (Existing Policy – Instruction Memorandum 2003-125, Procedures for Adopting and Managing Data Standards, requires that each data standard is supported by a data model and requires certain aspects of the data model to be fully described.)

Redundant Data – Data that contains the same information which is entered into multiple sources more than one time.

Relationship – A relationship is the tie between two entities that denotes how they ‘relate’ or ‘correspond’ to each other. Relationships can be one-to-one, one-to-many, or many-to-many.

Reverse Engineering – Reverse engineering is the process of examining and recovering data or source code from a file and using it to build or update a data model or to discover business rules.

Semantic Data Resource Data – The data resource that describes the relationship between data entities. It helps people understand the data resource and use that data resource to support their business activities. They include things like primary data names, data definitions, logical data structure, etc.

Six-Month Review of Access Rights – Requirement from the National Institute Standards of Technology to ensure that those who have computer rights to the data are only ones who do so.

Standards – An accepted measure of comparison for quantitative or qualitative value. An object that under specified conditions defines, represents, or records the magnitude of a unit. Commonly used and accepted as an authority. (e.g. When converting Celsius to Fahrenheit use the following formula C = (F - 32) x 5/9)

Standard Data Elements – These data elements have been identified as ones that are used across Bureau applications and datasets. Datasets and applications that use this data element should match the type and size specified. The BLM's Standard Data Elements can be found at: http://niop3app1.corp.blm.gov/datashopper/

Standard Names – A context-free, shareable atomic level information item that references a business fact. They are reusable data elements that do not belong to any particular business application. They are defined by providing a base name (e.g., Person Last Name), a basic definition, a standard size and format and a standard set of domain values.

Schema – A diagrammatic representation; an outline or model.

Security – The safeguarding of restricted access information against unlawful or unauthorized dissemination, duplication, or observation.

Sensitive Information – Information or data that requires protection due to the risk and magnitude of loss or harm which would result from inadvertent or deliberate disclosure, alteration, or destruction. The term includes information or data whose improper use or disclosure could adversely affect the ability of an agency to accomplish its mission, privileged data, and data not releasable under the Freedom of Information Act.

Spatial Data – Data of, relating to, involving, location or place. Often used in the context of Geographic Information Systems (GIS) and map products.

Spatial Dataset – A Spatial Dataset is one that has information that ties to longitudes and latitudes. It can be created by digitizing off a 1:100,000 scale map, with Geospatial Positioning Systems, or hand entered. Because it relates directly to the ground, additional metadata is collected to make it useful to those needing it.

Tabular Data – Any data that are maintained in traditional databases and displayed in tabular form.

Technical Data Resource Data – The data resource data that technicians need to build, manage and maintain databases. They include things like physical data names and structures, data types and formats, file specifications and sizes, access methods, etc.

USGS –United States Geological Survey (US Department of the Interior)

Vital Record – Records containing information that is essential for: (1) emergency operations during a disaster or a national emergency; (2) resumption and/or continuation of operations; (3) re- of the legal, financial, and/or functional status of an agency; and (4) determination of the rights and obligations of individuals and/or corporate bodies with respect to an agency.

WO – Washington Office

XML – Initials for Extensible Markup Language used for structuring data; designed especially to allow for the easy interchange of documents on the World Wide Web.