Earth Science Information System (ESIS)
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Historical Background

The Earth Science Information System (ESIS) was developed in 1981 by the U.S. Geological Survey's Office of the Data Administrator. ESIS serves as a comprehensive data management facility designed to support the coordination, integration, and standardization of scientific, technical, and bibliographic data of the U.S. Geological Survey (USGS). ESIS provides, through an online interactive computer system, referral to information about USGS data bases, data elements which are fields in the records of data bases, and systems. The data bases contain information about many subjects from several scientific disciplines such as: geology, geophysics, geochemistry, hydrology, cartography, oceanography, geography, minerals exploration and conservation, and satellite data sensing.

Characteristics

An important characteristic of ESIS is ease of use. The user is able to select functions to perform by means of menus listing selection options and is guided step-by-step by prompting, instructions, and detailed explanations. Preformated reports simplify retrieval specification. Security is assured by limitations of access and updating privileges through user registration and password assignment. Additional special features allow the creation of key words and phrases in data text as an aid to indexing and to allow for message communications via the system between the user and the Data Administrator. Most of the system's features may be used without any programming knowledge.

The system contains an inventory of data bases, a data element dictionary, and an inventory of automated systems: Data Base Inventory (DBI), first published as USGS Circular 817, describes USGS data bases in terms of these characteristics:

<table>
<thead>
<tr>
<th>Data Base Name and Acronym</th>
<th>Data Base Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Base Type</td>
<td>Users</td>
</tr>
<tr>
<td>System Name and Acronym</td>
<td>Availability</td>
</tr>
<tr>
<td>Division</td>
<td>Type of Access Method</td>
</tr>
<tr>
<td>Contact Person, Address,</td>
<td>Output Media</td>
</tr>
<tr>
<td>Phone</td>
<td>Storage Media</td>
</tr>
<tr>
<td>Subject Coverage</td>
<td>Number of Records</td>
</tr>
<tr>
<td>Keywords</td>
<td>Bytes Per Record</td>
</tr>
<tr>
<td>Geographic Coverage</td>
<td>Predicted Growth Rate</td>
</tr>
<tr>
<td>Geographic Area</td>
<td>Computer Type</td>
</tr>
<tr>
<td>Spatial Data Type</td>
<td>Computer Location</td>
</tr>
<tr>
<td>Coordinate System</td>
<td>Languages</td>
</tr>
<tr>
<td>Data Source</td>
<td>Data Base Management System</td>
</tr>
<tr>
<td>Data Structure</td>
<td>Data Base Description</td>
</tr>
<tr>
<td>Begin Time Span</td>
<td>Documentation</td>
</tr>
<tr>
<td>End Time Span</td>
<td>Date Submitted</td>
</tr>
<tr>
<td></td>
<td>Comments</td>
</tr>
</tbody>
</table>
Data Element Dictionary (DED) describes every data element in each data base in terms of these attributes:

- Data Element Name
- Synonym(s)
- Division or Office
- Definition/Description
- Unit(s) of Measure
- Cobol Data Name(s)
- PL/1 Data Name
- Identifier(s)
- Fortran Symbol Name(s)
- Assembler Language/Symbol Name(s)
- DBMS Element Name(s)
- DBMS Element Number(s)
- Length
- Detailed Picture
- Character Type
- Acceptable Values
- Data Standards Followed
- Relationship(s) to other Data Element(s)
- Record(s)
- File(s)
- Data Base
- System Name/Acronym
- Major Software Program(s)
- Identifier(s)
- Detail Picture
- Character Type
- Acceptable Values
- Data Standards Followed

Inventory of Automated Systems (IAS) describes those systems which access USGS data bases in these terms:

- System Name
- Acronym
- Division
- Application Category
- Data Base Accessed by System
- Contact Person, Address, Phone
- Description of System
- Date Implemented
- Date of Last Major Modification
- Expected Life of Application
- Other Systems Used in Conjunction with this System
- Application Status
- Estimated Annual Operating Costs
- Users
- Availability for Use/Access
- Type of Access Method
- Frequency of Data Input
- Frequency of Data Output
- Computer Type
- Computer Location
- Memory Required (K Bytes)
- Peripheral Devices
- Operating System
- Vendor or Commercially Developed Software or DBMS
- USGS Software
- Language(s)
- Input Media
- Output Media
- Input Location
- System Security
- Comments
- Date Submitted

Functions of ESIS

ESIS offers several capabilities supported by menus for option selection and step-by-step instructions to initiate these functions:

- **Online Data Entry** allows terminal entry of data base, data element, and system data in full screen or line-by-line teletype (TTY) mode.
- **Online Data Update** allows add, modify, and delete capability by terminal.
- **Batch Data Entry** is used for high volume data entry in batch mode.
- **Standard Queries** have access to a series of preformated outputs initiated by prompted parameters.
- **Ad Hoc Queries** is a capability for development of unique queries using the Model 204 Query Language which provides full Boolean capability.
- **Message Facility** is a means of communicating between user and the Data Administrator through ESIS.
- **Keyword Reference Facility** automatically indexes several text fields into key or subject words and phrases for retrieval purposes and reference.
Authorization and Move is a tool of the Data Administrator for filing data attributes which have been officially sanctioned by the standardization process of the USGS.

The Standardization Process

ESIS serves as a valuable reference for the standardization of data element names, definitions, and the particular codes or characters used to represent data.

The Data Administrator, concerned with the compatibility of data and systems, directs the coordination of the standards ratification process at the USGS, which evaluates and selects names, definitions, and codes for official use by the earth-science community.

All data elements initially entering ESIS automatically become "proposed" candidates for standardization. After standardization, the Data Administrator uses an automated Authorization and Move function to create "master" names, descriptions, synonyms, lengths, detailed pictures, and character types.

The Hardware/Software Environment

ESIS is located on the AMDAHL V7 at the USGS National Center in Reston, Va. It can be accessed by any teletype (TTY) compatible terminal and can be updated, in a full screen mode, through a Datagraphix 132B terminal.

Software used by ESIS is provided by the Model 204 Data Base Management System developed by the Computer Corporation of America.

ESIS Users—Four Categories

In order to differentiate between users granted authority to change values and to perform other systems functions, a hierarchy of user types was established. The hierarchy, in ascending order, is listed below:

1. **General User** may request a standard report or query, use the message facility and perform ad hoc queries.
2. **Contact Person** has the privileges of a general user and may enter and update data for which this person is responsible.
3. **Division Contact** has the privileges of a contact person but may enter and update data for all of the systems, data bases, and data elements of an entire Division or Office.
4. **Data Administrator** possesses all system capabilities including Authorization and Move.

How To Be Registered as an ESIS User

Anyone may become an authorized ESIS user simply by contacting the Office of the Data Administrator at the address listed on the back page of this publication.

ESIS Has Many Uses

Among its many uses, ESIS can be used as a guide for standardization, as a tool for system design or redesign through its data dictionary aspects, as a yardstick for measuring the economic impact of data or system changes, and as a provider of information such as:

- Users of USGS data,
- Sources of data,
- Available documentation,
- Computer hardware and software resources,
- Data that needs standardization or redesign,
- Volumes of data available.
The Following Queries Are Currently Available

<table>
<thead>
<tr>
<th>Query Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Data Base Names and Descriptions for a User-Specified Division</td>
</tr>
<tr>
<td>Q2</td>
<td>Data Element Information for a User-Specified Data Base Name and Data Element Name or Synonym</td>
</tr>
<tr>
<td>Q3</td>
<td>Automated System Information Selected by the Name of a Field in the ESISIAS and its Value</td>
</tr>
<tr>
<td>Q4</td>
<td>Data Element Information for a User-Specified Data Element Name or Synonym</td>
</tr>
<tr>
<td>Q5</td>
<td>Data Base and Data Element Information for a User-Specified Data Base Name</td>
</tr>
<tr>
<td>Q6</td>
<td>Data Base Name and Division by the Name of a Field in the ESISDBI and its Value</td>
</tr>
<tr>
<td>Q7</td>
<td>Data Base Identification for a User-Specified System Name from the ESISDBI</td>
</tr>
<tr>
<td>Q8</td>
<td>Data Element Names and Descriptions for a User-Specified Data Base Name or Acronym</td>
</tr>
<tr>
<td>Q9</td>
<td>Computer Program Identification for a User-Specified Data Base Name and Data Element Name</td>
</tr>
<tr>
<td>Q10</td>
<td>Record Description for a User-Specified Record Name and Data Base Name or Acronym</td>
</tr>
<tr>
<td>Q11</td>
<td>Data Base Counts for User-Specified Data Base Type and Division</td>
</tr>
<tr>
<td>Q12</td>
<td>Keyword Index Search for Specific Keyword/Phrase</td>
</tr>
<tr>
<td>Q13</td>
<td>Keyword Index Search for Specified Alphabetic Range</td>
</tr>
<tr>
<td>Q14</td>
<td>Keyword Index Search for Specified String</td>
</tr>
<tr>
<td>Q15</td>
<td>Names of Systems, Data Bases, or Data Elements in ESIS</td>
</tr>
</tbody>
</table>

The large volumes of ESIS data are securely protected.
Keyword Reference Facility

Much of the data in the system is in free or text form. This is automatically scanned and may be designated as key words or two- or three-word key phrases. The fields and records which contain these, and other closely related words, can then be easily retrieved and used as a reference to other information.

Documentation

These publications describe **ESIS** in greater detail:
- User's Guide,
- Detailed Design Specifications, and
- Systems Operations Guide.

They are available from:
Data Administrator
U.S. Geological Survey
115 National Center
Reston, VA 22092
Telephone: (703) 860-6086
FTS: 928-6086

Gathering data to be referenced by ESIS.