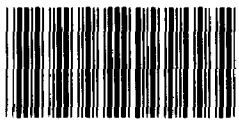
UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

COMMUNITY AND ECONOMIC
DEVELOPMENT DIVISION

B-206415

FEBRUARY 26, 1982



The Honorable Thad Cochran
United States Senate

Dear Senator Cochran:

Subject: Better Ways To Provide for Use of Agricultural Information (CED-82-46)

In your May 11, 1981, letter you expressed a desire to gain a better understanding of information sources, both Government-wide and private, dealing with agriculture; how access to these sources is provided; the potential users of these sources and how they can use the data available; and how best to give policymakers timely access to the information. As subsequently arranged with your office, we agreed to provide information on

--the magnitude of data sources available in one specific agricultural area--water for irrigation,

--the types and characteristics of services that provide information,

--the types and characteristics of users having a need for information on agriculture, and

--ways to arrange or structure various data sources to provide users with timely access to available and useful information.

We interviewed cognizant individuals and Government officials concerned with agricultural information and computer application issues and obtained information on data sources, information services, and data users. To identify references to information and actual data on the topic of water for irrigation, we reviewed the collections of the U.S. Department of Agriculture's (USDA's) National Agricultural Library in Beltsville, Maryland, and the USDA and GAO libraries in Washington, D.C. We used four USDA data bases--Agricultural On-Line Access System (AGRICOLA); Current Research Information System (CRIS); Food, Agriculture, and Nutrition Inventory (FANI); and National Accomplishment Reporting System (NARS)--to identify written materials, research projects, Government programs, and research accomplishments concerned with water for irrigation. We interviewed over 20 experts in information systems

(097600)

design and application from USDA, Bureau of the Census, Office of Management and Budget, U.S. Geological Survey, and private industry to get an overview of past experiences in building integrated information access systems. We did not examine the specific details of information source compatibility or the relative value or benefits of existing information systems and sources.

We made our review in accordance with GAO's current "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions." As you requested, we cooperated with USDA in making this review and this report summarizes the GAO-USDA analysis. USDA's Director, Science and Education, designated two USDA staff members to work with us.

This report provides an overview of agricultural information systems and users and suggests approaches to better identify and make existing information more useful. In summary, we found that:

--The amount of data available just on the topic, water for irrigation, is not only voluminous but is also presented in innumerable ways by a wide array of information services.

--Users have complained that information services, which provide bibliographic and/or numeric data, do not always respond in a timely way or that the information they provide lacks specificity, is not in an appropriate form, or is costly.

--Different types of users have unique information needs and various levels of understanding and ability to access information.

--An alternative to the current approach for using the massive amounts of agricultural information is an information mega-system which would involve putting existing information into one large data base. Another alternative is a user clearinghouse network which would employ a telephone communication network linking users and sources to provide access to all existing information sources; it would require little user knowledge of sources or experience in accessing them.

HUGE AMOUNTS OF DIVERSE INFORMATION SOURCES AVAILABLE FROM WIDE ARRAY OF INFORMATION SERVICES

To determine the magnitude of information available on the topic of water for irrigation, we assigned three library researchers to identify all possible information available on the topic and organize that information so that it could be used to address questions according to:

--Subject; for example, what research is underway on new water delivery techniques?

--Source of the information; for example, is the information available from more than one data base or library?

--Service provided; for example, where can one find a consultant or a bibliography on irrigation?

The researchers produced an index of information sources containing references to over 600 information services, including data bases, directories, research centers, consultants, publications, regulations, audio visual materials, libraries, Government agencies, and private organizations that deal with one or more aspects of water for irrigation. The information services had collected, organized, and presented their information in many different ways depending on their own limitations and the requirements of the individual users. The information was further differentiated according to whether it was bibliographic, such as references to literature, or numeric, such as census trend data.

The information services perform three basic functions: (1) input, (2) information analysis, and (3) dissemination and user services. The input function encompasses identifying, selecting/screening, acquiring, processing, and storing information and other types of materials within the service's scope and providing locator tools (such as indexes) to the collected items. The information analysis function involves synthesizing and distilling information and preparing publications such as bulletins, announcements, bibliographies, directories, state-of-the-art monographs, and handbooks for specific target audiences. The dissemination and user services function is designed to initiate contact with one or more target audiences, heighten their awareness of available information, and directly meet their information needs.

To accomplish their objectives, the services announce advances in research, distribute their information analysis publications and copies of materials from collections, respond to requests for information, and link users to other sources of information. For bibliographic information, the services can provide

--delivery and loan of books, articles, and tapes;

--responses to general inquiries;

--automated searches of internal and external data bases;

--special media and selected dissemination of information; and

--referrals to more expert sources. 1/

For numeric information, the services can provide

--special tabulations,

--analysis and data display,

--hardcopy reports,

--machine-readable tapes,

--software development,

--software distribution,

--training on how to access and use data, and

--special media dissemination.

Despite the wide array of information services which try to match users with sources, user complaints persist. These complaints indicate that existing information services have been unable to fully match users with sources. (See p. 5.)

USERS VARY BY TYPES, INFORMATION NEEDS, AND LEVEL OF SOPHISTICATION

The need for agricultural information varies by the types of users and by their specific information needs. The main user types are as follows.

Institutional		Individual/ general public
Government	Private	
Policymakers	Commodity traders	Homemakers
Legislators	Farmers	Elderly persons
Program managers	Suppliers	Students
Investigators	Processors	Gardeners
Law enforcement officers	Distributors	Investors
Attorneys	Marketing specialists	Shoppers
	Researchers	
	Educators	

1/Source: "Description and Analysis of Human Services Information Clearinghouses," Applied Management Sciences, Inc., 1981.

The users' information needs can be individual and specific or on a much broader and larger scale. For example, farmers' bibliographic information needs generally center on technical production, business management, and new farm programs, while their numeric information needs include such things as agricultural economic data and weather forecasts. For Members of Congress, on the other hand, bibliographic information needs can involve policy research, program interactions, Federal-State initiatives, and recent evaluations, while their numeric information needs can include balance-of-payment trends, crop estimates, import and export flows, and water and soil conservation statistics.

Users vary as to sophistication. Some users are very articulate about their information needs and are knowledgeable and experienced in using a variety of information sources. Other users need much more help in characterizing their needs and identifying and accessing the relevant sources.

Users, both the more and less sophisticated, have views on and complaints about how well the services provided are meeting their needs. The most frequent complaints expressed by users are as follows.

--Information provided not timely.

--Data hard to find.

--Unaware of what is available.

--Took too long to obtain the information.

--Information too general, too vague.

--Information too old.

--Information stated in overly complicated language.

--Information very costly to obtain.

--Insufficient detail.

--Information provided in inappropriate form.

Complaints about ease of access, timeliness, cost, and degree of detail were among the more frequent complaints expressed by the less sophisticated users. Sophisticated as well as unsophisticated users shared complaints about response time, lack of specificity, or inappropriateness of the form in which information was provided.

WAYS TO STRUCTURE DATA SOURCES TO PROVIDE TIMELY ACCESS TO AVAILABLE AND USEFUL INFORMATION

As this report shows, the problems in effectively using existing agricultural information center around three considerations:

--The amount of data available is not only voluminous but is also presented in innumerable ways by a wide array of information services.

--Different types of users have unique information needs and various levels of understanding and ability to access information.

--According to user complaints, information services do not always respond in a timely way and the information they provide sometimes lacks specificity, is not in an appropriate form, or is costly.

We identified three alternatives for providing access to the massive amounts of diverse agricultural information available from data sources. The first is to continue the current approach. This approach emphasizes developing specific information for specific users, encourages uncoordinated individual information system development, offers no reduction in user complaints, discourages user and information interchange across subject areas, and requires no additional direct costs.

The second alternative, which could be called a megasystem, would involve placing all existing information into one large data base that would make all information accessible to all users through a common computer access language. This alternative would emphasize a technical, computer-dependent solution; encourage the exchange of information because sources would be centrally located; require reorganization of existing information; and cost more than the other options.

The third alternative would be to establish a user clearinghouse network that would provide access to all of the existing information sources through an access system requiring little user knowledge or experience (typically called a "user-friendly" system). It would employ a telephone communication network to link users and sources. This link or interface mechanism supported by the telephone communication network is computer software that entertains user queries and identifies information sources that could answer those queries. Once sources are identified, the computer accesses the sources, retrieves the appropriate information, and displays it to the user, showing the data as well as its sources. The user would therefore not be required to have knowledge of

sources or how to access them. This option would emphasize increased user awareness of other applicable information sources and user ability to access those sources. It would also encourage interaction between information providers (and thus information sources) through exposure to a wide variety of users, use specific information sources "as is" through a central network, and provide a flexible clearinghouse to broker independent sources. This option would require an additional cost but it would be less costly than the megasystem option.

A MODEL ALREADY EXISTS AND USDA HAS TAKEN SOME ACTION

A model for a user clearinghouse network (the third alternative) already exists at the Environmental Protection Agency (EPA). That system, called the Chemical Substance Information Network, is being used to access the many information sources on chemical substances and the toxic effects of those substances. It accesses the sources for the users and responds to user queries in understandable English. The user does not have to know how to access any source because the Chemical Substance Information Network actually makes the telephone call and "talks" to the information source.

USDA has a conceptual plan, called AGRISOURCE, similar to EPA's Chemical Substance Information Network for the use of the clearinghouse network, but it is only in the initial stages. AGRISOURCE may be the way to make existing information sources more useful and we will continue to monitor its development. If you require more detailed information as the system develops, USDA should be able to provide you with a detailed implementation plan for AGRISOURCE showing phases of development, costs by phase, and opportunities for adapting existing technology.

- - - -

As arranged with your office, we are sending copies of this report to Congressman George E. Brown and the Secretary of Agriculture. Copies will also be available to other interested parties who request them. Because we worked with USDA in preparing this report, we requested no formal agency comments on its contents.

Sincerely yours,

Henry Eschwege

Henry Eschwege
Director