

Access to scientific information through Computerized Information Systems

Linda M. White

In 1973 over 100,000 new books, pamphlets and leaflets were issued U.S. copyrights . . . each year over 400,000 articles appear in major journals and periodicals in fields of science and technology . . . one U.S. governmental bookseller and publisher annually issues 60,000 new titles . . . worldwide there are over 55,000 serial publications that appear more than once a year.

Facts like these assume a new significance when an individual must delve into this vast pool of literature to extract information on some topic of interest. The topics can be varied: techniques to revegetate stripped mined areas; recreational use of wilderness sites; recent research on burning wildlands; findings in solar energy

development. Particularly if the topic is in technical or scientific fields, users may turn to numerous computer based information systems which will serve as links between users and documents.

Information systems may be developed by governmental agencies and departments, by abstracting and indexing companies, by national or regional libraries, by professional societies, by universities, by public libraries, or by private business. Some deal with source data. More often, they are bibliographic systems, providing users with *references and document copies*. After storing references to documents (i.e., a book or ar-

ticle and associated indexing terms on computer disks or tapes, bibliographies can be generated by subject, author, publishing agency, and/or date of publication. In addition to a specially produced bibliography to meet an individual request, information systems often published generally distributed bibliographies based on the information stored on their tapes.

Brief descriptions of six "science-oriented" systems follow. These systems — CAIN, WRSIC, SSIE, NTIS, ALIS and WAMIS — were chosen because of their general usefulness to persons in agriculture and natural resources in Arizona.

CAIN (Cataloging and Indexing System)

Developer:

The U.S. National Agricultural Library develops tapes for all items received and cataloged by the Library, uses these tapes to produce various bibliographies, and sells the tapes to subscribers who run searches for individual persons.

Scope:

The National Agricultural Library's objective is to acquire one copy of all substantive publications in the field of agriculture. Much of its data base consists of references to foreign literature which the Library receives. Topics covered are general agriculture, plant science, soils and fertilizers, forestry, animal industry, entomology, agricultural engineering, agricultural pro-

ducts, agricultural economics, and food and human nutrition. Included in this system are monographs, journal articles, proceeding papers, all publications of the U.S. Department of Agriculture, and reports of research supported by Department of Agriculture funds. There are about 500,000 citations in the base (as of late 1974), with some 8,000 currently being added monthly. This system began in 1970, and most of the references are to literature published since that date.

Products:

Regularly produced bibliographies produced from the CAIN tapes are *Bibliography of Agriculture*, *National Agricultural Library Dictionary Catalog*, and *Agricultural Economics*. Sub-

scribers to the tapes may also obtain special searches which give for each reference the author, title, date, source, and the National Agricultural Library's classification number.

Contact:

Inquire at the nearest research library as to whether or not a contract exists between that center and CAIN or a CAIN subscriber. Two centers which provide access to CAIN tapes for a fee are (1) the Center for Information Services, University Research Library, University of California at Los Angeles, 90024, and (2) the Technology Application Center, University of New Mexico at Albuquerque, 87131.

WRSIC (Water Resources Scientific Information Center)

Developer:

Since it was established in 1966, the U.S. Office of Water Resources Research in the U.S. Department of Interior is charged with disseminating scientific and technical information to the national water resources community.

Scope:

This system covers an interdisciplinary mix of natural, physical, and social sciences relating to water resources supply, conservation, management, protection, law, engineering, planning, and pollution. Types of publications covered include journal articles, report literature, monographs, symposia and conference proceedings, and research supported by the Water Resources Research Act. Although the system does cover some foreign studies, most of the research reported

has been conducted within the United States. As of late 1974, there were some 80,000 references in WRSIC, with 15,000 currently added each year. Most of the literature cited in the bank has been published since 1966.

Products:

Selected Water Resources Abstracts, which appears twice a month, and *Water Resources Research Catalog* are two regularly appearing publications from WRSIC. Additionally, WRSIC produces specialized bibliographies,

About the Author — Linda M. White is a Research Associate in the School of Renewable Natural Resources, The University of Arizona.

distributed through the National Technical Information Service, such as *Urbanization and Sedimentation — A Bibliography*, 1971; *DDT in Water*, 1971; and *Subsurface Water Pollution, Part I, Subsurface Waste Injection*, 1972. These bibliographies can be found by looking in *Selected Water Resources Abstracts* under the term "bibliographies." The WRSIC tapes may also be searched individually for specific searches, by contacting the regional center acting as an outlet for the tapes. The bibliographies provide

not only the citation of the article or book but also an abstract and the indexing terms used for the document. The abstract further clarifies the content of the document, to help the user decide if he should obtain a copy of the publication.

Contact:

Information requests should be sent to one of these regional centers: (1) University of Arizona, Water Information Section, Water Resources Research Center, Tucson, 85721; (2) North Carolina State University,

Water Resources Research Center, Raleigh, 27607; (3) Cornell University, Water Resources Research Center, Ithaca, New York, 14850; (4) University of Wisconsin, Water Resources Research Center, Madison, 53706; and (5) Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Department of Interior, Washington, D.C., 20240. Most of the centers charge a small fee for searches. The Water Information Section, University of Arizona, currently does not charge users for searches of the WRSIC tapes.

SSIE (Smithsonian Science Information Exchange)

Developer:

The Smithsonian Science Information Exchange was established in 1949 by federal agencies engaged in the support of research in the medical sciences. It has since expanded beyond the field of medicine, but its purpose remains to facilitate the planning and conduct of research.

Scope:

SSIE is particularly designed to meet the prepublication information gap. The system's purpose is to inform others of what research is currently being conducted in the United States and who is doing the research. SSIE receives prepublication records of research-in-progress from government agencies, universities, foundations, and private industry. The data base refers to some 100,000 current research projects, and the list is revised as research projects are terminated and new ones come into existence. Because SSIE accesses current

research developments and trends, it can be especially useful at the proposal writing stage of a new project. Major categories in SSIE are agricultural sciences, behavioral sciences, biological sciences, chemistry and chemical engineering, earth sciences, electronics and electrical engineering, materials, mathematics, medical sciences, physics, and social sciences and economics. A few examples of the more specific subjects covered are pest control measures, fish and wildlife biology, wastewater treatment, mineralogy, air pollution, plastics, market structure, and soil mechanics.

Products:

In response to an inquiry, a user would receive a package of Notices of Research Projects (NRPs), which give the grant number, the supporting organization, the project title, investigators and their affiliation, the funding, and a brief project summary. SSIE provides various products which users may order for a fee: (1) SSIE

Science Newsletter, which lists by title already prepared NRPs; (2) research information packages (i.e., bibliographies of NRPs) which vary in length and price depending on the topic; (3) custom searches at \$50 per search for up to 50 NRPs; (4) standard selective dissemination of information services, sent each month for \$180 a year; (5) custom selective dissemination of information services, sent four times a year and screened by SSIE staff, for varying prices; and (6) historical custom searches (i.e., research projects not currently in the bank).

Contact:

A free brochure describing SSIE's range of information services and their costs is available upon request by writing the Smithsonian Science Information Exchange, Inc., Room 300, 1730 M Street, N.W., Washington, D.C., 20036. Requests for searches should be sent to the same address.

ALIS (Arid Lands Information System)

Developer:

Beginning in 1967, this specialized system was developed by the Office of Arid Lands Studies, University of Arizona, with National Science Foundation funding. Since 1972, it has been supported entirely by The University of Arizona.

Scope:

In general, ALIS covers world-wide problems in the development, regeneration, and understanding of the world's deserts and their adjacent arid and semiarid borders, with emphasis on their physical and biological environment. Some of the topics covered are wildlife, soil properties, revegeta-

tion, solar energy, land reclamation, geomorphology, and water sources. References are to journal articles, books, dissertations, technical reports, international agency documents, and publications of foreign governments and institutions. Information selected for the system is based more on relevancy to a particular topic than on a particular cut-off date, so literature published before 1967 is included in the system. The storage base is approximately 5,500 citations.

Products:

This system is set up to provide references and referral services and

manual and computer literature searching services in the area of arid lands research. Regularly produced bibliographies include *Arid Lands Abstracts* and *Arid Lands Resource Information Papers*. Computers are also used to generate for individuals special bibliographies which include citations and abstracts. ALIS does not normally distribute copies of the documents.

Contact:

Inquiries for information should be sent to Patricia Paylore, Assistant Director, Office of Arid Lands Studies at 1201 E. Speedway, The University of Arizona, Tucson, 85721.

NTIS (National Technical Information Service)

Developer:

The National Technical Information Service of the U.S. Department of Commerce functions as a center for the collection, retrieval, and public sale of the published results of U.S. government-sponsored research, with some input from foreign sources and private industry. Historically, its predecessor was the Office of Technical Services, founded in 1946. In 1964 it was called the Clearinghouse for Federal Scientific and Technical Information, and it became NTIS in 1970 as it broadened to include business and commercial information. NTISearch, the on-line access to tapes which permits personalized searches, has been available since 1970.

Scope:

Citations in NTISearch are published technical and scientific reports of government sponsored research and development reports and other government analyses prepared by federal agencies or their contractors and

grantees. Coverage also includes federally-sponsored translations and some foreign-language reports in areas of major technical interest. However, federal agencies provide 99 percent of the input to NTIS. NTISearch has accumulated 360,000 citations since July 1964 and adds about 50,000 a year to the base. Subject coverage is broad and cross-disciplinary, with some of the topics being: aeronautics, agriculture, chemistry, communications, earth sciences, electrical engineering, fuels, marine engineering, mathematics, nuclear science, oceanography, and physics.

Products:

A search can be run through NTISearch, with the resulting printout having abstracts, if so desired. Once particular references are known, copies of the reports can be ordered through NTIS in two forms: (1) paper bound reports, often an off-set printed black and white facsimile copy of the original or (2) microform, generally

microfiche. Regularly produced bibliographies generated from NTIS tapes are *Government Reports Announcements* (twice a month), *Government Reports Index*, and *Weekly Government Abstracts*. Additionally, microfiche copies of reports on set categories can be sent to subscribers.

Contact:

Some regional information centers and libraries have access to NTIS tapes, but other individuals may write directly to NTIS for searches. The address is NTISearch, U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia, 22161. Customer searches are priced at \$50 for up to 100 abstracts and citations, with added charges for more abstracts. Two brochures are available from NTIS describing (1) NTISearch Information Packages (NTIS-PR-186) and (2) NTISearch and NTIS Information Services (NTIS-PR-154).

WAMIS (Watershed Management Information System)

Developer:

The School of Renewable Natural Resources, University of Arizona, began development of WAMIS in 1972. This project was supported in part with funds provided by the U.S. Department of Interior as authorized under the Water Resources Research Act of 1964, Public Law 88-379, and by the U.S. Agency for International Development. WAMIS works in cooperation with the Office of Arid Lands Information System, ALIS, and uses the *Thesaurus of Arid Lands Terminology* for indexing and a computer program developed by ALIS for storage and retrieval of references.

Scope:

Land management practices and effects on water and other products, such as timber production, herbage production, wildlife habitats, and recreational use, is the general scope of WAMIS. The core of WAMIS references comes from a literature review of water yield improvement potentials in Arizona through vegetation management for the following vegetation types: alpine, mixed conifer, aspen,

ponderosa pine, pinyon-juniper, chaparral, grasslands, desert shrub, and riparian association. Citations for this literature review number about 1,700. WAMIS emphasizes studies done in Arizona and the Southwest, but also includes references to work done elsewhere. There is additionally some material on vegetation for erosion control and afforestation. Document types include governmental agency publications, conference and symposia reports, theses and dissertations, monographs, journal articles, and some progress reports.

Products:

WAMIS is set up to respond to individual requests for literature searches, and sample topics for searches have been: burning chaparral vegetation, chemical controls of riparian vegetation, timber growth of southwestern species, habitat improvement through clearcutting and thinning, elk and deer research, snow accumulation in forests, water quality following logging, and range improvement in the Southwest. The computer printout

sent to the user in response to a request contains the citation for the reference and a 50- to 200-word abstract. *WAMIS Abstracts*, bibliographies showing a sampling of the WAMIS bank, are distributed by the School of Renewable Natural Resources.

Contact:

Information requests should be directed to Linda M. White, School of Renewable Natural Resources, College of Agriculture, University of Arizona, Tucson, 85721. Additionally, a brief article further describing the system (WAMIS — A Bibliographic Information System for Water Yield Improvement, by Linda M. White) is available.

The information systems described above serve as examples of the large number of systems available in the fields of science and related technology. Information retrieval has advanced much since the early 1950's when the term was first coined. As information and publication numbers continue to increase, so hopefully will use of systems designed to access information.