"Hand it to them on a silver platter: meeting researchers needs in the electronic age"

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Abstract

This paper describes the Electronic Resource Library (ERL) at http://plutonium-erl.actx.edu. This is a web-based, subject-oriented digital library on the topic of plutonium and its ancillary disciplines. Previous research analyzing differences in the information-seeking behavior of scientists and engineers is reviewed and lessons learned applied to this digital library model. Special consideration has been given to recommendations in the SATCOM report from the National Academy of Sciences/National Academy of Engineering Committee on Scientific and Technical Communication. This report strongly advocated the development of "specialized need-group-services" to support the work of the engineer and practitioner.

Introduction

With the advent of the Internet, the establishment of the Document Exchange Laboratory at Amarillo College, and the Z39.50 data exchange standard, the Electronic Resource Library is equipped, staffed, and technologically competent to deliver previously unavailable *"hand-tailored"* SDI services to scientists and engineers studying plutonium and related topics.

Funded by the Amarillo National Resource Center, the ERL is charged with providing state-of-the-art access to timely and relevant information for researchers in the Nuclear and Environmental Science departments at Texas A&M University, Texas Tech University, and the University of Texas.

The overall mission of the Electronic Resource Library is to collect in one place all the literature published on the topic of plutonium and it's ancillary disciplines since it's discovery in 1941. Using this overview, the ERL has been built from ground zero to serve specific information-seeking needs of scientists and engineers.

SATCOM Report

In 1969, concerned about the "engineers information problem," the National Academy of Science published the SATCOM report. (1) This report challenged the

existing premise that scientists and engineers obtain information identically, finding that the two groups sought information very differently from one another, for different reasons, and for different purposes. This early study strongly advocated the development of specialized "need-group-services" to support the work of the engineer and practitioner. It recommended that the ultimate goal in compiling information for scientists and engineers was to "provide *hand-tailored access* for the individual."

Derek J. de Solla Price

Early research on how scientists and engineers obtain information needed to get their work done was spearheaded in 1963 by Derek J. de Solla Price (2) in *Big Science Little Science*. Price was the first to identify the concept of the "Invisible College"(3) and was the first to point out that "scientists use information to - produce information; and engineers use information - to produce some physical change in the world."

Price found that both science and technology develop in a cumulative manner, with each new advance building on the vast quantities of work that had gone before. He made the distinction that "within the *scientific* literature all work up to any point can be found recorded in the literature, - whereas the literature published in *technological* journals does not cumulate or build on itself as does the scientific literature."

He also reported that the cumulative nature of science can be demonstrated in the way in which citations among *scientific* journal articles cluster and form regular patterns over time…."whereas, citations to previous *technological* papers are fewer and are more often to the author's own work."

Price also pointed out that "publication occupies a position of *great* importance to the scientist because it serves to document the end product and establish the scientists' reputation, ensuring that the scientist is properly credited by future generations. Engineers place less importance on publication, which is secondary to the actual utilization of the technical innovation. They feel that this archival function is not essential to the technologist's principal legacy to posterity, which is encoded in the physical structure giving the example that "Wilbur & Orville Wright were not remembered because they published papers."

Thomas J. Allen

Expanding on this theme, Allen and Gerstberger's (4) study of scientists' information-seeking behavior found that research scientists *are* heavy users of libraries, that they *are* interested in theory, source data, guides to the literature, and *do* make greater use of formal information channels and sources.

Analyzing the information-seeking patterns of engineers they found that engineers get most of their information from colleagues. Engineers want quick answers to specific questions, and "accessibility will almost always dictate their selection of an information channel."

Looking for ways to explain these findings, Allen (5) devised the input-output model of scientific and technical information showing that scientists use information to produce information, and reasoned that from a system standpoint, the input and output, which are both verbal, are compatible. "The output from one stage (the published paper) is in a form required for the next stage (the papers and discussion). Engineers, however,

use information to produce some physical change in the world. Engineers consume information, transform it, and produce a product that is information bearing; however, the information is no longer in verbal form." The documentation is a by-product.

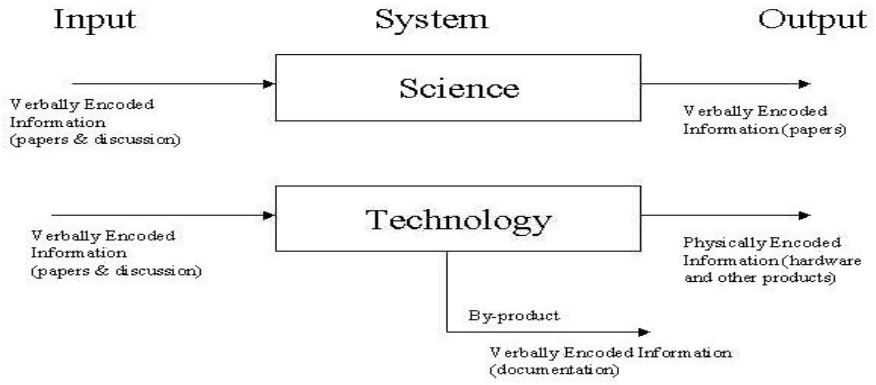

Figure 1. (USED WITH PERMISSION) "Distinguishing Engineers from Scientists, Bv Thomas J. Allen " IN *Managing Professionals in Innovative Organizations* by Ralph Katz, 1988. Published by Ballinger Publishing.

Allen says that scientists working at the frontier of a particular specialty know each other and associate together in invisible colleges, sharing information outside their organizations easily and without restrictions, "keeping track of one another's work….long before it reaches archival publications." Engineers, on the other hand, keep abreast of their field by close association with co-workers in their own organizations, however, they are limited from forming invisible colleges by the imposition of organizational barriers – such as, guarding corporate patents and trademarks.

Thomas E. Pinelli

In 1991 Thomas E. Pinelli, (6) affiliated with NASA Langley Research Center, compiled an impressive bibliography supporting the argument that previous research did *not* distinguish between the information-seeking behaviors of scientists and engineers as

separate and distinct groups and as a result of this error in identification neither group was served adequately by the information providers.

Cains and Compton

Cains and Compton (7) commenting on the SATCOM report, pointed out that scientific and technical "need group services" are at a level beyond primary communication (initial publication in journals or books) or secondary communication (abstracting and indexing) and manifest themselves in what was called "*third-level-services.*" Developing these "*third-level-services"* has directed the dynamic design of the Web-based Electronic Resource Library, built for the Amarillo National Resource Center.

Resources in the Electronic Resource Library

The subject-specific electronic resource library on the topic of plutonium makes significant contributions toward meeting the recommendations of the forty-year old SATCOM report. Its dual access design features "*third-level services*" developed as a result of research studying the information-seeking behavior of both scientists and engineers.

Scientists studying plutonium use, storage, disposition, transportation, and their ancillary topics will find a comprehensive database of citations to the critical mass of publications linked to full text/image documents whenever possible.

Engineers who need quick, accurate, reliable facts will find those types of resources in the Electronic Resource Library services designed for that purpose.

The Collection or PuCORE

The COLLECTION also called the PuCORE, contains over 4,000+ subject-targeted scientific and technical full text/image pdf documents ranging over 59 years of publication on the topic of plutonium. The files are quality controlled, with all extraneous marks and specks “cleaned” to reduce the size of the 1 Mg. files which are linked back to html “content” pages, as well as connecting sections of the document into one easily navigable electronic document.

For example: a search of “criticality safety” produces a weighted hit list of titles that link back to the 1Mg. file. This particular title contains yellow “sticky notes” that link between the 1Mg. sections of the document as well as linking back to the “content” page built on an html page. The researcher is never confused as to where they have navigated in the electronic document.

PuCAT catalog

The 70,000 plus titles in the PuCAT catalog are expected to grow to over 120,000 titles that collect in one location the body of published literature on the topic of plutonium and its ancillary disciplines.

Never a dead end, the Z39.50 data exchange standard, incorporated into the PuCAT records, provide the capability of linking every citation to, a) either the full text/imaged document or b) to the FYI Document Delivery center.

This is accomplished by entering the URL for the full text document into the 856 field of the MARC record. The document can then be accessed through the local library Z39.50 enabled automated system.

Technical References

The TECHNICAL REFERENCES button on the ERL home page link to the full text of publications like *Reactor Physics Constants*. This out-of-print compilation of the values of the constants, recipes, and formula used to identify reactor characteristics has been enhanced and *hand-tailored* for fast and convenient access by busy engineers.

Also found here, is a collection of early plutonium research called *The Saxton Document Compilation.* At the request of researchers, these original, declassified, government documents are ordered from the Office of Scientific and Technical Information, scanned, processed and tracked to ERL html controlled collections where the researchers can access them quickly and easily through the Internet. In addition, a special collection is prepared for OSTI to download into the InfoBridge, thus sharing and disseminating the digitized documents with other collections for exponential accessibility and distribution.

SDI Services

Another example of *hand tailoring of information for specific individual research* is the newly developed SDI (Selective Dissemination of Information) button in *the Electronic Reserve Room* of the ERL. Here specific information pertinent to the researchers' projects is collected for easy and convenient *third-level* accessibility under the researcher's name.

For example, a button with Dr. Carl Beard's name triggers access to specifically collected resources pertinent to his information needs. SDI services include database retrieval sets, links to pertinent Websites, and specially selected full text documents and reports.

Figure 2: The *third-level* service button for Dr. Carl Beard behind which all needed resources will be readily available.

In Conclusion

The Electronic Resource Library provides customized access to information going beyond the traditional archival mission of "preserving the scholarly record" described throughout the library science research literature. The ERL design applies lessons learned from previous communication research studying the nature of the information-seeking habits and practices of scientists and engineers.

Never before in the history of library and information service has it been possible to serve the researcher customized information, gathered specifically for their research projects, and delivered dynamically……..on a silver platter, so to speak.

Using this information-access model, library /information professionals spend their time doing what they do best – identifying, locating, retrieving, collecting, and organizing information……. so that the researchers (driven by time and deadline constraints) can "spend" their time accessing, reading, analyzing, synthesizing, and creating new solutions to urgent and important problems.

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