Proceedings of the 9th Annual
Federal Depository Library Conference

October 22 - 25, 2000

Enabling Scientific Progress with DOE Products/Tools/Services

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I want to thank the Federal Depository Library Program for inviting me here this afternoon.

Information technology has raised the expectations of researchers for access to information in the physical sciences. We in the Department of Energy (DOE) are beginning to address researchers' expectations by low-cost deployment of this technology.

The new technology allows, for the first time ever, for information centers like ours to be reached directly by researchers. I will be quick to point out that this in no way compromises the essential role played by libraries, which traditionally have been our primary audience. They have an important role, but one that is changing, too. Libraries have always guided their patrons to information resources; today they have a growing role in pointing their patrons to resources on the Internet. They also have a role, not yet fully exploited in my view, of shaping resources on the Internet as they evolve.

Today, we can share knowledge as never before possible. The very concept of an information collection is being revised. No longer need an information collection be actually collected in one physical location. Information can reside at multiple sites; it can be a virtual collection.

Similarly, the concept of a library is being revised. No longer need a library be one physical place. We now speak of digital libraries that are accessible from almost any place. They can have all the advantages of the Internet to which we have now become accustomed: almost instantaneous access, no cost to patrons, full text information.

Our concept at DOE is to deliver RELIABLE information in world-class products using new information technology, which is available now for the first time ever.

Already, our center at DOE has vast virtual collections of full text gray literature, vast virtual collection of hyperlinks to full text journal literature, and searchable access to as many of the preprint servers in the physical sciences as we can find in the world.

Young researcher at work

Today, I will share with you a story of a young researcher. His ambition is to help to create a world in which there is inexhaustible, clean energy. Having been accepted into a graduate Fellowship program in Automotive Technology at his University, he is assigned to research storage technologies for hydrogen fuel cells. Practical storage of hydrogen remains an important hurdle. He hopes to develop inexpensive, on-board hydrogen storage for the car of the future. His budget, time and resources are limited. He will consult his University librarian to guide him to the information resources he needs. The librarian points him to the information provided by DOE as one major resource.

OSTI products

Department of Energy products, tools and services are at their disposal. Many of these services are available through GPO Access.

Among his first tasks, it is important for this researcher to see what type of research has been done. In this way, he will become confident of his knowledge of the state of the art in hydrogen storage. Further, he needs to learn whom he might collaborate with to obtain information. How can he accomplish this?

Federal R&D Project Summaries home page

To check out research project summaries in hydrogen fuel cell technology, he searched the Department of Energy's Federal R&D Project Summaries database, a Web-based interagency tool. This site makes project summaries of 240,000 Federal grants, and awards available for him to review.

Federal R&D Project Summaries Search Results

With a single, distributed query, he was able to search three vast databases: DOE's R&D Project Summaries Database, the National Science Foundation (NSF) Awards Database and the National Institutes of Health (NIH) CRISP system. Thus, with one search, he accesses the three largest grant-making agencies in the world. By searching this system for fuel-cells AND hydrogen, he found 13 DOE research project summaries and 52 NSF Awards. From NIH, he learned about a new ceramic technology that could be used for transportation systems. From DOE and NSF, he tracked down several experiments about on-board hydrogen generation. Of great value to him were the details of the awards, the project abstracts and principal investigator's contact information.

Next, he wanted to read up on Department of Energy research that had recently been completed. His librarian was aware that DOE has a huge R&D program (about 8 billion dollars per year) and that DOE has made all of its gray literature available electronically since 1995!

DOE Information Bridge

He searches the Department's DOE Information Bridge Web site. In the bibliographic record, he searched for "hydrogen storage" and finds 133 full-text DOE research reports. This site offers almost 5 million pages of searchable full-text in 60,000 research reports, presenting the results of over 100,000 person-years of effort.

Bridge search results

He is then able to search within the full-text of selected reports to find advanced hydrogen storage technology about a recently developed storage metal. He was also pleased to find an analysis of the costs associated with transporting hydrogen in vehicles. He is saving himself time and money because he thought he would have to perform this analysis himself.

GrayLIT Network home page

Having examined DOE gray literature, he is ready to look at the gray literature from other agencies. At the OSTI site, he taps into the search engines of the Government's gray literature collections, enabling him to search over 100,000 full-text Government documents without knowing the sponsoring agency.

Search Page

He executed a distributed search on this site and, in addition to the report literature found on the DOE Information Bridge, he retrieved 1 report from DTIC, 49 documents from NASA JPL, 48 documents from NASA Langley, and 100 documents from EPA on hydrogen storage.

GrayLIT Search Results Page

This research tool is the world's most comprehensive portal to Federal gray literature. By offering a mode of communication for this hard-to-find class of literature, the GrayLIT Network enables convenient access by the American public to Government information. This integrated search mechanism is indicative of a new age in making information available to the public regardless of its form, format, or where it resides.

Now, as this researcher is well aware, it is invaluable to read peer-reviewed journals when researching a project. He is overwhelmed with the prospect of searching through all of the appropriate journals. He also would like to do some of his research from home during the summer but he does not have personal subscriptions to the journals. However, his computer is connected to his University's network. His librarian directs him to PubSCIENCE.

PubSCIENCE Home Page

From his desk at home, he goes to the PubSCIENCE Web site where he is able to quickly navigate through 2 million journal abstracts with a single search. He searches for "carbon nanotubes" one of the hydrogen storage technologies currently under investigation and retrieves 190 peer-reviewed journal article abstracts, a number of which are related to his particular interests.

PubSCIENCE Search Results

He is then able to hyperlink to the journal publisher's doorstep, retrieve the journal and read the complete full-text articles because his University library has subscriptions to many of the journals. For other articles, he opts to use the pay-per-view option.

Science Magazine May 2000 Issue

Being told where to go to find specific information in journal articles, then directed to the journal and full-text article has again saved this researcher considerable time and effort.

Science Magazine abstract/full-text

He finds that PubSCIENCE provides him 1,250 peer-reviewed journals from 35 prestigious world-wide publishers. It is made available by a unique partnership with Federal Government and scientific journal publishers.

Early findings on hydrogen storage are also available to this researcher through preprints--work circulated by authors outside of the traditional publishing environment, through research papers that have been submitted for dissemination and review among peers, for publication in journals, or prior to presentation at conferences.

PrePRINT Network home page

He discovers he can get to 1,525 preprint sites from DOE's PrePRINT Network, the only cross preprint search vehicle in the world! Here he has a field day using distributed search to survey through 330,000 preprints from all of these sites with one query.

PrePrint Search Results
Remote Preprint Site

He is able to find 21 preprints or eprints on an initial search for carbon nanotubes, link directly to the full-text of the preprint, visit the hosts of the preprint information. He was also provided links to some 180 scientific societies and associations which focus on topics related to DOE's R&D research initiatives.

Finally, a cross-cutting system using the distributed search technology allows him to search 500 diverse Web sites and databases on a specific subject, deep within information layers to retrieve resources he is not aware exist. He searches EnergyFiles.

EnergyFiles Home Page

Selecting the Renewable Energy topic, he was provided a huge resource index of related STI databases and Web sites, publications, conference proceedings, and international collections.

EnergyPortal Search Results Page

Selecting the EnergyPortal functionality, he found 94 documents on hydrogen storage costs.

OSTI Logo

These systems are what the Department of Energy's Office of Scientific and Technical Information (OSTI) is about. We create the products, tools, and services that give this researcher the information he needs to do his work. We provide your libraries these resources to help these researchers do their work.

All this is just the beginning. More needs to be done with text: digitizing the repository of historic physical science literature (which only exists in paper or microfiche); making the availability of electronic journal literature truly comprehensive; and making the physical sciences more user friendly for education, business, and communities.

But text is just the beginning. Once text is conquered, there are domains of images, video, and audio. Text is but the low-hanging fruit. Other media are on the frontier being explored by R&D programs.

We have a vision to help this researcher even further, to give him and millions of other researchers and students like him a fundamentally new way of doing science. As you can see, great progress has already been made in delivery of textual information to the desktop. We have a vision to put a system in place that allows the rapid communication of information essential to their success.

The Department of Energy is proposing a Future Information Infrastructure for the Physical Sciences.

Future Information Infrastructure for the Physical Sciences

What we hope to create in the next four to six years is:

- a common knowledge base that seeks in an integrated approach to provide comprehensive access and facilitate the reuse of worldwide sources of physical sciences information, regardless of where they reside, what platform(s) they reside on, or what format or data structure they employ.

- a point of convergence for ensuring the awareness, availability, use and development of information technologies and tools to facilitate information assimilation, data analyses, peer communication and collaboration, sharing of preliminary research results, remote experimentation, validation of experimental results, etc.

- a freely available source of information to serve all users, from students to scientists to concerned citizens, in a highly efficient electronic environment, with tools to assist users in their quest for information and ultimately knowledge.

DOE hosted a Workshop in May of this year at the National Academy of Sciences to address an information infrastructure of the physical sciences that would increase the productivity of the scientific enterprise in the United States.

Workshop Report

The results of this Workshop can be read in "A Workshop Report of a National Infrastructure of the Physical Sciences." This report is an enthusiastic endorsement from the scientific community for a national infrastructure for the physical sciences. I encourage you to take a look at this report. It may very well result in a better way for your libraries to serve your research and educational communities.

Young Researcher again

It may very well change the way young researchers realize their dreams.

You are invited to stop by OSTI's exhibit booth and find out more about our products, tools, and resources. Further, we seek your input about the evolution of information products on the Web. We at OSTI make systems happen. We make content happen. In doing this work, we want to address your needs.

Thank you for providing me the opportunity to talk to you.