The Transportation Resource Exchange Center (T-REX):
A Virtual Library on All Aspects of the Transportation of Radioactive Waste and Materials

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ABSTRACT

The Transportation Resource Exchange Center (T-REX) is a first-of-its-kind Virtual Library dedicated to providing information about the transportation of radioactive materials (RAM) to all interested parties or stakeholders.

INTRODUCTION

The Transportation Resource Exchange Center (T-REX) is a first-of-its-kind Virtual Library dedicated to providing information about the transportation of radioactive materials (RAM) to all interested parties or stakeholders. The ATR Institute (ATRI) at the University of New Mexico has developed the T-REX Center under a cooperative agreement with the National Transportation Program (NTP) of the US Department of Energy (DOE). The information is free of charge and online at www.trex-center.org/. Guided by the principles of the National Environmental Policy Act (NEPA) planning and decision-making process, the Website was created to serve as a "one-stop shop," source for information, to facilitate public involvement, overcome information gaps, and foster clearer communication and understanding among and between stakeholders regarding radioactive waste transportation.

The ATRI identified five specific main goals necessary to fulfill the mission of the T-REX Virtual Library:

- Supply pertinent information to diverse audiences;
- Provide reference and research services;
- Develop training for utilizing the T-REX;
- Improve the management and dissemination of information; and
- Build relationships that promote user assistance in developing the T-REX.

The ATRI determined that a feedback mechanism would be necessary to meet the needs of the T-REX's different and diverse audiences, because stakeholder input assisted the T-REX staff in acquiring a deeper understanding of the diverse roles filled by stakeholders. The T-REX staff also incorporated feedback from stakeholders to be able to better accommodate specific requirements in the T-REX Center's service capabilities. So that T-REX Website truly would be able to become the national clearinghouse for information regarding the transport of RAM, the T-REX staff designed and engineered the Virtual Library to be a well-developed, finely crafted conduit for the seamless flow of documents and data in the information stream between the producers, users, and repositories of information regarding RAM transport.

FORMATIVE RESEARCH AND RESULTS

Prior to the creation of the T-REX Website, two research tools were developed to identify the gaps between potential users' questions and the information that was available regarding stakeholder issues. *The T-REX User Needs Assessment* assessed the information needs and preferences of potential users who were DOE and Non-DOE stakeholders. The study commenced in October 1998 and concluded in January 1999. Thirty-seven participants were DOE stakeholders, and 41 were Non-DOE stakeholders. Participants were surveyed about their daily work experiences, information use, wants and needs in securing information, and the availability and accessibility of information.

Because stakeholders are a diverse group of individuals with varying knowledge and expertise, the T-REX Website was designed and is maintained to meet their differing needs. Several innovative features were created and implemented to maximize user friendliness and application utility of the T-REX, based on information obtained from DOE and Non-DOE stakeholder information needs assessments *before* the Website was created.

DOE stakeholder information needs included:

- State, federal and international regulations,
- Interpretation of regulations,
- DOE orders,
- Shipping program information including manifests, characterization, packaging, and routing,
- Responsibilities for the different aspects of transport,
- Shipping projections,
- Availability of packaging,
- Accident statistics for a variety of materials, modes and geographic areas,
- Lessons learned from shipping programs, and
- Outreach efforts by the DOE.

Non-DOE stakeholder information needs included:

- DOE decisions on routing and programs,
- Transportation protocols,
- County, State, and Tribal regulations,
- Entities responsible for shipping,
- Environmental assessments and impact statements,
- Access to real-time graphic mapping and monitoring of shipments,
- Cultural information related to Tribal governments,
- News articles provided in a real-time manner, and
- Training materials and/or kits.

The second assessment tool, *The National Transportation Information Resource Survey*, surveyed specialized libraries, DOE reading rooms and academic institutions to identify what documents and kinds of information were available and where they were housed. The survey determined the extent and types of information available by information providers. The results of the survey were compiled in mid-January 1999. All interviews were transcribed, numbered, and coded.

The coupling of the provider survey and user needs assessment has helped to ensure that the T-REX has the answers to user questions. In the most basic sense, the results produced by these two research tools informed the T-REX designers of what information related to radioactive material transport is available, as well as the categories of information that are the most highly prized by users. As an example, "environmental issues" and "current news regarding radioactive waste -highly prized subjects of both DOE and Non-DOE stakeholders. Daily news updates from the US and around the world can be found on the Headlines Web page at www.trex-center.org/nuevo.asp. From the user assessment information, a broad range of subject categories were complied, including: Carriers, Education/Training, Emergency Management, Health, Laws/Regulations, Packaging, Public Participation, Routes, States, Students/Teachers, and Tribal.

To build an ontology, the T-REX staff collected, recorded, and reviewed terms used to express transportation-related activities from online sites to determine which activities were carried out by or relevant to T-REX users. On an ongoing basis, the T-REX staff assesses the findings and develops the ontology, a logical data design, and an overview of its user base.

THE NEPA EARLY PUBLIC INVOLVEMENT MODEL

A special aspect that reviewed for insight into the public or key stakeholders' concerns regarding the transport of radioactive materials transport was later incorporated in the design and update of the Virtual Library was a series of T-REX studies, *Content Analyses of US Department of Energy Environmental Impact Statements*. This series identified, compiled, and categorized all public comments and responses regarding radioactive transportation issues from DOE Environmental Impact Statements *(*EIS) from 1995 to the present. EISs are detailed, descriptive reports, which must include any adverse environmental effects that cannot be avoided should a specific proposal be implemented, as well as must include alternatives to the proposed action. Furthermore, as mandated by NEPA, the EIS must include the relationship between local short-term uses of the human environment and the maintenance and enhancement of long-

term productivity and any irreversible and irretrievable commitments of resources that would be involved in the proposed action. At specified times in the EIS process, the federal agency—in this case, the DOE—which is seeking to initiate the proposed action is required to provide early notification to stakeholders and solicit their views. During the comment periods, these stakeholders may ask questions or offer comments orally or in writing to the federal agency in charge regarding the environmental impact or proposed remedies of the action. The series of studies of EIS comments and responses, was conducted to determine comment trends and produce a user-friendly set of frequently-asked-questions and answers. In the Virtual Library, an annotated bibliography series which now includes EIS Comments and Responses, Risk Communication, and Routes are additional information products that emerged as a result of the EIS study.

TRANSPORTATION OF RADIOACTIVE MATERIALS DATABASE/SEARCH ENGINE

Within the T-REX Virtual Library, the Transportation of Radioactive Materials (TRAM) Database and TRAM Search Engine were designed to provide instantaneous results when a user queries the system for the DOE or Non-DOE individuals or organizations that possess expertise or specific information regarding any aspect of the transportation process.

Design features were built into the TRAM to overcome problems reported by stakeholders during the user assessment, such as usability difficulties, missing content and information overload. These problems and corresponding solutions are outlined in Table 1. The logical data design of the TRAM is also based on the results of the user assessment and provider survey. The TRAM is located at trex-center.org/thetram.asp.

TRAM developers created a layout design to enhance navigability. Design features of the TRAM include:

- The TRAM name and logo on every page, with the logo linked to the homepage,
- Straightforward, simple headlines and titles on each page,
- Structuring page sections using a layout,
- Maximizing the use of hypertext on all pages,
- Employing mouse-overs, which are brief written explanations of all link buttons that appear when the mouse is resting over the button, to help the user predict what information will be provided by links, and
- Having a search capability on each page.

Included among the over 850 individuals or groups listed in the TRAM are representatives from typical stakeholder groups: the DOE and the national laboratories, environmental groups, corporations, health professionals, emergency responders, public interest groups, community organizations, and officials and agencies from all levels of government, and from the sovereign American Indian nations. For each individual or organization listed in the TRAM database, a wide range of information is provided, including background/history, corporate affiliates, geographic scope of work, information products, and contact information. From the user needs assessment, stakeholders reported eight types of content to be either absent, or difficult to locate on the Internet as shown in Table 2.

REFINEMENT AND INNOVATION

Several other features of the T-REX have been established to overcome other gaps in information. The T-REXDEX is the searchable database of over 1,900 online documents in the T-REX Virtual Library and is located at trex-center.org/dexsearch.asp. Portions of the T-REX also have been translated into the Spanish language, with plans to translate more sections in the future. Recursos en Español: or Resources in Spanish are located at trex-center.org/spanish.asp.

The T-REX-L, the listserv® to provide periodic email bulletins to T-REX patrons, is located at www.trex-center.org/list.asp. The T-REX offers information reference services to assist stakeholders in finding/obtaining the information they need. The T-REX staff can assist users find or obtain needed information through email links to users at trex@unm.edu so that users do not need to search the Internet. The T-REX staff make sure users are aware of pre-existing information resources, and also provide facts and tips to users who have difficulty in their information searches. The T-REX staff can answer information access questions by email, fax, and phone. T-REX's toll free telephone information hotline is available at 1-877-287-TREX (8739).

VALUE-ADDED WEB SERVICES

The T-REX provides value-added Web services. Because the World Wide Web itself is built on linking, and the Internet is a network, these technologies work well together making it unnecessary to recreate repositories, such as DOE Databases, DOE Public Reading Rooms and Libraries, DOE and other pertinent Online Serials, Glossaries, and Fact Sheets which already exist. In fact, these sites provide customized instructions for to direct a user from the starting point to the desired destination. The T-REX's online Reference Desk Web at trex-center.org/reference.asp, connects the T-REX pages to already established reference sources. All that was necessary was to link these repositories to the T-REX Website in a programmatic way to generate the intended pages by using simple linking schemes according to a protocol.

Table I: Information Problems and the Corresponding TRAM Features

Information Problem Type	TRAM Feature
Hard to get	All information available about the organizations involved in the transport of radioactive materials on the Internet can be found in the TRAM.
Hard to use Too voluminous or lengthy Too fragmented Not flexible/searchable	The TRAM is searchable on four levels: Major function of the group, minor function, scope of work and Internal/External DOE status.
Apparently does not exist Never collected Collected in the wrong units Classified	The limited keywords supplied by the TRAM will guide users through performing more precise searches than if users were to conduct searches through free keyword terms.

Table II: Stakeholder Content Problems and Corresponding TRAM Features

Information Content Problem	TRAM Feature
State, Federal and International Regulations	Searchable by organizations that create, enforce or interpret Laws and Regulations at the International, National, State or DOE Site levels.
DOE Employee Database, searchable by Responsibility and/or Expertise	Searchable by area of expertise and provides individual contact information when the expert is located.
Future Shipments	Searchable by Waste Generators and DOE sites. These groups frequently have a projected shipments component on their Web sites.
Packaging Availability	Searchable by organizations that develop, test, certify or track packages.
Accident/Risk Data	Searchable by organizations that analyze incidents, assess safety, risks or health effects and improve safety.
DOE Decisions on Routes and Programs	Searchable by organizations that determine routes, enforce route requirements and maintain historic or predict future shipments by route.

Information Content Problem	TRAM Feature
A List of Identified Shippers	Searchable by carriers in the areas of air, sea, truck, rail or inter-modal in conjunction with the levels of [DOE] site, state, national or international shipments.
Materials/Funding Available for Training	Searchable by Emergency Management Training according to the levels: [DOE] site, state, national, or international.

USABILITY

To make the T-REX Virtual Library more functional, design decisions were made regarding the appearance of links, explanations as to where users can go/where each link will lead, identification of the user's current location, a site map of the information architecture, and creation of easy-to-use, searchable databases. The overall user-centered design, layout, format, and features of T-REX Website so that users can perform required tasks with a minimum of stress and a maximum of efficiency. Information specialists at the T-REX Center have worked collaboratively with the Virtual Library's database developers throughout the life of the Website.
The usability of any website depends on what the designers *and* the users are trying to accomplish. In the case of the T-REX Center, users are seeking information, not surfing the Internet. The kinds of items on Websites generally used to attract users who are surfing, such as sites with slow-loading graphics, splash screens, sound effects, and music, are in direct conflict with the goals of users who are on the Internet for information retrieval. As information seekers, T-REX users do not attempt to grasp the site's overall layout in their information quest; they quest tends to take a very focused approach. To meet the needs of users, the design intent regarding active links is to make them highly descriptive, yet simple enough so an the information seeker would be able to pursue an information path through the Website. The language used in the links helps T-REX users to successfully predict where each link will lead. Clear navigational aids are required to enhance application utility and user satisfaction. Vague or redundant link language is confusing and frustrating to users. The T-REX Website undergoes evaluative assessment by the T-REX staff and UNM students approximately every six months. Periodic usability testing is important because even the most aesthetically pleasing Website can be difficult to use.

TRACKING

Special tracking software was installed to perform comprehensive website analysis. The software scans the site and checks for online problems, such as broken links, slow pages, orphaned pages, stale content, poor HTML syntax, deep pages, broken anchors or missing meta-tags. Reporting software was installed on the server to process website log files and produce comprehensive reports, including: general statistics, resources accessed, visitors and demographics, activity statistics, referrers and keywords, browsers and platforms. During calendar year 2000, the T-REX Website received approximately 62,000 visits or hits by users. The number of hits is projected to near 100,000 in calendar year 2001.

CONCLUSION

The T-REX is built on the assumption that the management of RAM transport information for all stakeholders is like other bodies of knowledge. The collection, organization, and dissemination of this information is a complex and time-consuming process. The T-REX staff will ensure that stakeholders have the information they need and that the information is provided with maximum efficiency, user friendliness, and reliability. The two overarching goals in establishing and maintaining the T-REX Website regarding the transportation of radioactive wastes and materials are: (1) creating the premier online information resource for the "Nuclear Family," as well as the Global Community, and (2) ensuring that the T-REX Website is highly-visible, well-known, and trusted by stakeholders.

The T-REX's use of the "NEPA early public involvement model" to create its Virtual Library for public outreach and information makes this national clearinghouse the premier Website to provide answers to stakeholders' question regarding the transport of radioactive waste.

REFERENCES

1. Bennett, N., Jordan, T., and White, M. E., (n.d.). *Content Analyses of US Department of Energy Environmental Impact Statements (1995-Present).* Unpublished raw data. Albuquerque, NM: ATR Institute, University of New Mexico.

2. Jordan, T. (1999, January). The National Transportation Information Resource Survey. Unpublished report. Albuquerque, NM: ATR Institute, University of New Mexico.

3.

4. Jordan, T. (1999, January). The T-REX User Needs Assessment. Unpublished report. Albuquerque, NM: ATR Institute, University of New Mexico.