



CASE STUDY

U.S. Department of Energy Manages Nuclear Weapons Safety with Alchemy

Industry	Government
Challenge	Mission-critical data retrieval
Solution	Captaris Alchemy Document Management system
Results	\$170K system paid for itself in 12 months; improved data retrieval speed by over 80 percent; upgraded retrieval accuracy to 100 percent.

BACKGROUND

For many years, maintaining confidence in the performance and safety of the U.S. nuclear weapons arsenal has been the responsibility of the government national laboratories and weapons production facilities. Historically, though computational prediction methodologies have been used, they were validated with weapons testing. The weapon tested was referred to as a Nuclear Test Unit (NTU).

In 1992, President George Bush committed the United States to a moratorium on nuclear weapons testing, creating the need for validating designs for weapon modifications and upgrades through other means while continuing to ensure the safety and reliability of the nuclear arsenal. The Accelerated Strategic Computing Initiative (ASCI) was conceived as a way of developing advanced computational modeling and simulation capabilities that would be used to model nuclear weapons and predict their behavior. Validation of sophisticated, computer simulation codes as they are developed requires data from actual NTU construction and testing that is then supplied to the ASCI computational modeling and simulation activities by the U.S. Department of Energy's (DOE) Oak Ridge Y-12 Plant, in Oak Ridge, Tenn.

The Y-12 Plant has manufactured components for every weapon in the existing U.S. nuclear weapons stockpile. Within the Y-12 Plant, the Y-12 Development Division has performed experiments and measurements on materials and components for approximately fifty NTUs. Results from this work have been recorded in the division's Technical Progress Reports (TPRs), as well as other formal and informal reports.

THE CHALLENGE

Providing these reports to design laboratory personnel in an efficient and useful manner required that the reports be in an accessible database. However, prior to 1998, the documents existed only as paper. A search of the paper archives took an hour or more and was not guaranteed to find every instance or location of information. Accurate retrieval is crucial since users must review every document pertaining to a particular NTU. The ASCI Program's need to rapidly search and retrieve relevant NTU-related technical information from the TPRs required that a prototype electronic archive equipped with NTU-related TPRs be established.

The value of having such an electronic archive was recognized early in the project, as the TPR paper archives contain information relating to current work and are utilized frequently by research scientists. An electronic archive of the entire TPR paper library would have immediate benefits by reducing the time required for search and retrieval of relevant

information. The decision was made to convert the entire TPR collection to electronic form and install it in the archive. The information contained in the archive will be useful for many years, as it contains valuable manufacturing, materials and experimental data that will allow scientists to simulate weapons testing for the ASCI program. In fact, many of the reports are more than twenty years old and are still an invaluable source of unique information.

THE SOLUTION

The Oak Ridge Y-12 Electronic Archive database contains more than 8,900 documents and associated document profile data, where each document may consist of text, graphics and occasionally pictures. Within two weeks, a document imaging system and electronic archive was implemented and integrated to scan, index and perform full-text search and retrieval for specific information. In order to preserve the documents' original layout and appearance, as well as perform full-text search and retrieval (a requirement by the division's scientists), the Adobe Portable Document Format (PDF) "image plus hidden text" file format was chosen as the electronic document format for the archive.

Hard copy documents are scanned into the system using off-the-shelf software from Adobe Corporation. Documents are scanned in as TIF files and converted on-the-fly to Adobe's PDF "image plus hidden text" format to preserve the text with the image of the page. Once the pages are proofed and corrected, the documents are indexed and archived using Captaris Alchemy Document Management software.

The master database can be duplicated on CD-ROM for distribution to users without direct access to the system. Using the DataGrabber extension, the master database or a subset (which may represent specific NTUs or a set of documents fulfilling a specific search request) can be exported to other databases or to other applications. For users who wish to see a representative example of the archive's content, document profile information can be printed. The databases are stored on RAID drives, with a separate back-up made to CD-ROM as well as digital tape. Consistent with DOE policies on data migration to assure future availability of data, the data stored on CD-ROM, as well as that stored on the RAID drives, will be periodically migrated to newer storage media to ensure continued safekeeping.

Initially the Y-12 Development Electronic Archive will be made available to internal personnel only on the Y-12 classified network system. The project team plans to extend their solution in the future to a secure Web server for external access by design laboratory personnel.

THE RESULTS

Searches for information now take under five seconds, and locate every instance of the chosen search term. This high degree of effectiveness is crucial since users must review every document pertaining to a particular NTU. Assuming five searches per day, a conservative time savings of approximately five hours per day is recognizable. Multiplied by approximately 250 working days per year, this amounts to 1,250 hours per year retrieval savings. At a cost of more than \$125 per hour, savings in retrieval time alone equals more than \$156,250. A key additional benefit is that all document searches are thorough and all relevant documents are retrieved—not the case with the previous paper-based system.

The cost of the hardware and software, including installation, was approximately \$20,000. The labor cost of scanning, OCR, cleanup and indexing was about \$150,000. Return On Investment (ROI) took a little over a year. The total number of searches is expected to be much higher once the electronic archive is accessible over the Y-12 classified network and available to a larger number of users, leading to an even greater ROI and visible cost savings.

FOR MORE INFORMATION

Captaris Business Information Delivery solutions help organizations of all sizes automate the information and document flow throughout the information lifecycle (capture, process, deliver, manage and archive). With a comprehensive suite of software and services, Captaris helps organizations to grow revenues and increase profits while meeting compliance goals. Through a global distribution network of leading enterprise technology partners, Captaris has installed more than 90,000 systems in 95 countries in companies of all sizes, including the entire Fortune 100. For more information, visit www.captaris.com or call 1.800.443.0806.

©2005 All rights reserved. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language in any form by any means without the written permission of Captaris. Captaris products Alchemy, Interchange, RightFax and Captaris Workflow are trademarks of Captaris. All other company, brand and product names are the property and/or trademarks of their respective companies.