D&D Knowledge Management Information Tool – 2011 - 11297

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ABSTRACT

Deactivation and decommissioning (D&D) work is a high priority activity across the Department of Energy (DOE) complex. Subject matter specialists (SMS) associated with the different ALARA (As-Low-As-Reasonably-Achievable) Centers, DOE sites, Energy Facility Contractors Group (EFCOG) and the D&D community have gained extensive knowledge and experience over the years in the cleanup of the legacy waste from the Manhattan Project. To prevent the D&D knowledge and expertise from being lost over time from the evolving and aging workforce, DOE and the Applied Research Center (ARC) at Florida International University (FIU) proposed to capture and maintain this valuable information in a universally available and easily usable system.

INTRODUCTION

The D&D Knowledge Management Information Tool (KM-IT) is a web-based tool custom-built for the D&D user community by the Applied Research Center (ARC) at Florida International University (FIU) in collaboration with the Department of Energy, the Energy Facility Contractors Group (EFCOG), and the ALARA Centers at the Hanford and Savannah River Sites.

D&D KM-IT serves as a centralized repository and provides a common interface for all D&D related activities. The main purpose of this process is to improve efficiency by reducing the need to rediscover the knowledge and to promote reuse of the existing knowledge. D&D KM-IT is a community driven system. It facilitates the sharing of knowledge within the D&D community by gathering, analyzing, storing and displaying D&D related information.

D&D KM-IT has the ability to define, store, categorize, index and link digital information corresponding to D&D problem areas. The system has the ability to allow users to search for and subscribe to relevant content and presents the content with sufficient flexibility to render it meaningful and applicable across multiple contexts of use.

Too frequently, people in one part of the D&D community "reinvent the wheel" or fail to solve problems quickly or in an optimum fashion because, while the knowledge they need may exist elsewhere, it is not known or accessible to them. This knowledge management tool helps to enhance collaboration and knowledge sharing while building upon the D&D knowledge base within the EM's D&D community. As the generational cycle of the D&D cleanup progresses into the future the knowledge pool and its best practices for D&D applications will expand.

D&D KM-IT promotes knowledge innovation where new knowledge will be created and converted into valuable goods and services. This tool provides an environment where creativity and learning will flourish and knowledge will be encapsulated in a form that can be applied.

D&D KM-IT aims to get the right content to the right people at the right time and in the right form. It uses the World Wide Web as the primary source for content in addition to information entered by the subject matter specialists and the D&D community.

In this paper, FIU ARC will present the various new modules added to D&D KM-IT in fiscal year 2010-2011 that are designed to capture information from the D&D community and build the knowledge base for future use.

MATERIALS AND METHODS

The requirement from DOE Headquarters was to develop a repository and a dynamic system that will make excellent use of the knowledge that exists within the D&D community by allowing D&D project managers around the DOE complex to share innovative ideas, lessons learned, past experiences, and practices.

D&D KM-IT is being developed and deployed in multiple phases, providing solutions to the D&D problems, sharing best practices, yellow pages, customized web searching, technology solutions, etc. It will evolve as a centralized high-end knowledge repository where D&D scientists and engineers can search for information related to their field of expertise.

Underlying system and information technologies will provide shared conceptualization to describe people, process and content. They will provide a semantic framework from which information can be harvested, modeled, published, retrieved, used and shared. The next generation of information technologies will be used to create, manage and extract value from their knowledge assets and to integrate these technologies to create a complete approach to the knowledge life cycle.

As there was no off-the-shelf computer application or integrated solution available for building the D&D knowledge base, ARC is building an approach that will service the DOE complex with a, high performance, n-tier web-based system for capturing the information from the DOE sites/facilities, ALARA centers, EFCOG and the D&D community as a whole as shown in Fig 1.

This system is being built using Microsoft.net framework®, SQL server 2005®, and SQL server reporting services®. Visual Studio 2005™, Dream Weaver® and Photoshop® were also used as development tools to construct the system.

RESULTS AND DISCUSSION

D&D KM-IT can be accessed from the web at www.dndkm.org. The system home page, shown in Figure 1, provides the interface to connect to the various components of D&D KM-IT.

Fig. 1. D&D KM-IT website home page.

D&D knowledge management is the overall strategy, approach or philosophy followed to build the D&D KM-IT which is the information tool integrating knowledge management in the D&D area. Following are the new components or modules of D&D KM-IT that were successfully developed and deployed in fiscal year 2010-2011:

- Web Crawler
- Administration
- Data Mining

Web Crawler

The custom D&D web crawler will search and retrieve information from the web through customized web sites or links specified by the D&D KM-IT system (e.g., Science.gov, NRC, ORAU, ORISE, EPRI, IAEA, etc.). Another part of the D&D web crawler will provide search capabilities for the D&D KM-IT repository. Figure 2 shows the concept for the search engine.
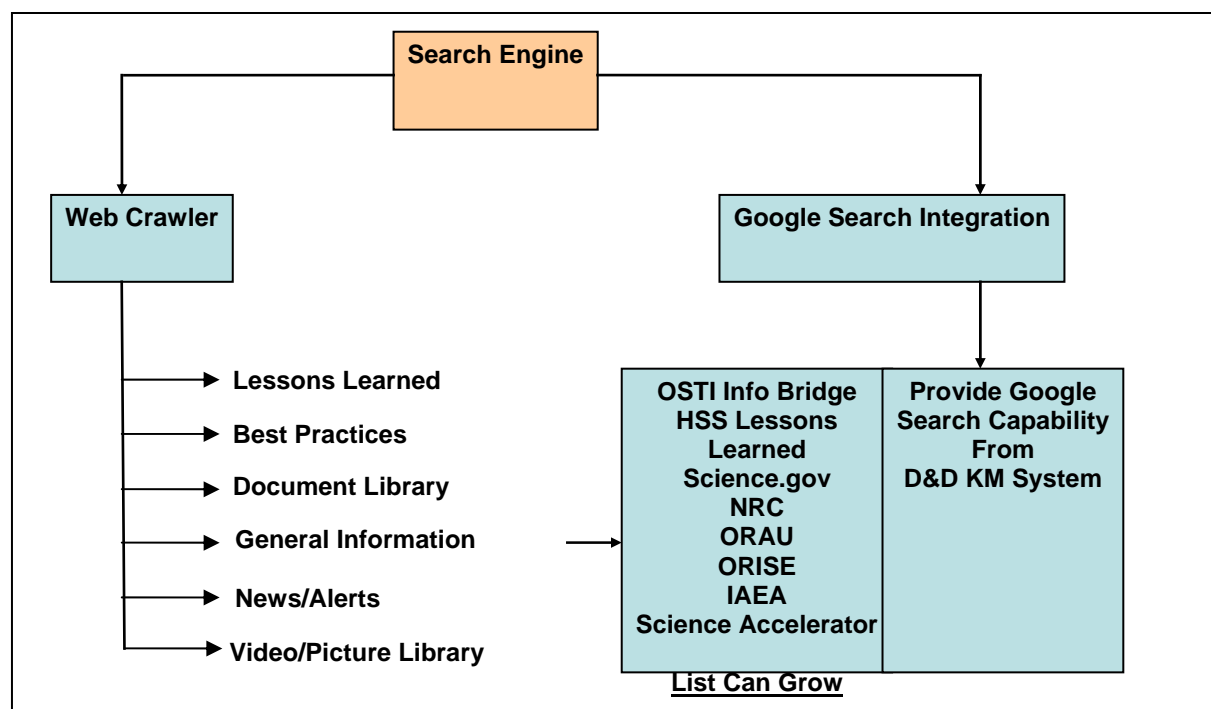
Fig. 2. D&D KM-IT search engine concept.

When a user enters a query into the web crawler, the crawler examines its 'index' and provides a list of the best-matching web pages according to the criteria, usually with a short summary containing the document title or part of the text. The usefulness of the search engine depends on the text it returns. The custom web crawler will search and return the information only from the specified web links it has been provided with; thus, the search can be more refined and categorized.

Another part of the D&D web crawler will provide D&D KM-IT search capabilities for its own repository. D&D KM-IT will define the search scope for the crawler to include documents like lessons learned, best practices, videos/pictures, etc., from its own repository. The D&D web crawler's search can be narrowed down to the pool of important information customized for the D&D community.

Lessons Learned

Lessons learned enables the members of the D&D user community to understand and benefit from the past experiences gained while working on a specific project. The lessons learned module provides a repository of documents published by the D&D community. This will allow users to share their experiences with the D&D community. The web crawler searches through the Lessons Learned repository and displays search results based on search criteria used by end user. Crawler will search though the published documents content and display results based on the entered keywords. and help the D&D community to avoid previously encountered difficulties. Registered users are able to upload their documents or files which will be used by the community.

Lessons learned documents in the form of PDF, Excel, Word, etc., files are published by various professionals to their organization's websites (Science.gov, NRC, ORAU, ORISE, IAEA, EPRI). They are located and presented as a search result in this module, providing the lessons learned within the D&D KM-IT system and saving the user the time and energy needed to visit each individual website. By using the lessons learned made available in one location by this module, the user can learn how to proceed to develop a well-structured and documented project plan, schedule, and list of milestones as well as learn which issues should be monitored and discussed, what decisions should be made and how to best communicate the information in an effective manner. This will ensure that the projects that are being performed by the D&D community members move forward consistently. By taking full advantage of the lessons learned module, a user can gain valuable insight into how to best manage a project and how to develop a proven system of implementation. The overall objective is to deliver valuable D&D lessons learned to the end user. The module also highlights advice to the users for comparing the pros and cons of different projects. Every effort is made to help the D&D community by sharing the experiences gained when working on D&D projects. This can be a great resource for all users, students, researchers and practitioners in the D&D field.

Best Practices

Within knowledge management, best practices have become a key component in deciding the important steps to start a project and develop it in the right way. Straight talk, good advice, and real-life experience can all be valuable to assuring a successful D&D project. Best practices will provide the repository of D&D best practices documents that the user community has uploaded to the D&D KM-IT system. The web crawler will return the links to the best practice documents based on the search string entered by the user. This can provide helpful information to the D&D community, both new and experienced professionals in the field.

Document Library

The document library is a digital archive of D&D related documents created and maintained by the D&D community over the web. The library contains many documents produced by the members of the community that are involved with Science.gov, NRC, ORAU, ORISE, and IAEA, etc. These documents could be related to the projects, notifications, and memorandums which are of major interest in D&D. The web crawler will search through the documents from the document library and return results matching the user selected search criteria. Links to these documents will be provided with an option to download them. Reading these documents can help the users to evaluate the strategies used on his/her projects. Maintaining the document library is similar to a content management system. Many issues come into play while managing documents, like where the documents are stored, how they are filed, and how they can be retrieved. An important issue that must be managed is preventing unauthorized users from reading, modifying or destroying documents. D&D related documents are checked and maintained by the designated administrators from the D&D community and DOE HQ. Users are allowed access to versions of the selected documents which are published for public reading after review.

The web crawler will search through all of the documents that are uploaded to the websites of Science.gov, NRC, ORAU, ORISE, and IAEA, etc. These documents can be related to the D&D areas of interest and provide valuable information about the activities in major technical and management areas. These documents can be in any format (e.g., Word, PowerPoint, Excel, Adobe acrobat, etc.).

General Search

The general search refers to any information published to the list of custom sites where the D&D web crawler will perform a search. The website administrator and contributors to the website will provide information stored on the web server. The custom web crawler will search through the site's textual information based on the search string entered by the user and will return links to those websites where the keywords were found. This will allow the user to search through the website content and return results.

News and Alerts

Web crawler will scan the web and will look through the submittals from the community to locate up-to-date news about the people, conferences, papers and other events that relates to the D&D community. This module performs customized web searches by looking for the information over the web based on keywords entered by the user. This information will be collected in real time and displayed on D&D KM-IT in a customized format.

Video Picture Library

The web crawler will search through the video and picture library from the custom list of websites established after discussions with the D&D community. Websites may have integrated web pages and a library of videos and images. The video picture library module will be comprised of the pictures and videos from past and current D&D activities. The web crawler can

search through GIF (graphics interchange format), JPEG (joint photographic experts group), PNG (portable network graphics) files as well as the common video formats like .AIF (audio interchange file format), .MP3 (Mp3 audio file), .MID (MIDI file), and .WAV (WAVE audio file). It is necessary for the user to install the specific software and associated drivers in order to download or view the pictures/videos on their computers or personal digital assistants.

Administration

System administration: This includes the day-to-day maintenance and administration of the D&D KM-IT Servers. Major tasks involve load balancing, active directory accounts, security patches, operating system updates, system optimization, server monitoring, emergency problem resolution etc. FIU maintains the KM-IT application system to ensure a consistent high level of performance.

Database administration: This includes database backup, optimization, performance tuning, and system security, controlling and monitoring user access to the database, maintain database cluster and other management tasks on a regular basis.

Network administration: This involves monitoring the network and server traffic, installation and maintenance of network hardware/software, assigning address to computer and devices on the network, troubleshooting network activities and performance tuning.

Data Mining

Data mining focuses on capturing the manager experience through the EFCOG points-of-contact. In an effort to capture the lessons learned and best practices acquired at DOE sites, FIU is working with EFCOG to establish a data collection process where subject matter specialists (SMS) from various sites will be able to share their experiences and lessons learned with the EM D&D community.

The D&D KM-IT application will be modified and enhanced to publish the SMS's experience. As an initial effort to populate the Lessons Learned and Best Practices modules, FIU contacts EFCOG members at DOE sites and coordinate efforts to obtain lessons learned and best practices and this information is then be added to the KM-IT system. Any new D&D related technologies found during the collection of lessons learned and best practices will be researched and added to the "technology module" of KM-IT.

CONCLUSION

D&D KM-IT provides single point access to all D&D related activities through its knowledge base. It is a community driven system. D&D KM-IT makes D&D knowledge available to the people who need it at the time they need it and in a readily usable format. It uses the World Wide Web as the primary source for content in addition to information collected from subject matter specialists and the D&D community. It brings information in real time through web based custom search processes and its dynamic knowledge repository.

Future developments include D&D information access through mobile devices, vendor management and collaboration tools. The goal is to develop a high-end sophisticated and secured system to serve as a single large knowledge base for all the D&D activities. The system consolidates a large amount of information available on the web and presents it to users in the simplest way possible.