Sharing Lessons Learned in the Department of Energy

John C. Bickford

Fluor Hanford, Inc.
P.O. Box 1000 (H5-24)
Richland, WA 99352-1000
John_C_Bickford@rl.gov

Abstract

A lessons learned is a "good work practice" or innovative approach that is captured and shared to promote repeat application. A lessons learned may also be an adverse work practice or experience that is captured and shared to avoid recurrence. This document briefly describes how the U.S. Department of Energy (DOE) developed processes and tools for sharing those lessons learned. It also relates those processes to a specific electronic tool used in work planning and suggests some applications for improving that tool with artificial intelligence.

Background

The Department of Energy (DOE) consists of headquarters programs and organizations, operations offices and field offices in ten states, and additional sites, laboratories, and facilities in nearly all the remaining states. Each of the programs and offices work with multiple contractors and subcontractors to accomplish their wide variety of missions including renewable energy research, nuclear power, accelerator research, environmental restoration, and international nuclear security, just to mention a few.

Historically, knowledge within DOE has been separated into "stovepipes" or bins for security reasons. During the Manhattan Project, workers were given only enough details about the specific aspect of their job (e.g. building a chemical processing plant) to enable them to perform their part of the task. They were specifically discouraged from discussing or even speculating about other segments of work going on around them. Only a few people were granted access to all aspects of the nuclear weapons development and production program to limit potential security leaks. Consequently, operations at any given facility were conducted independently of other facilities and organizations. Furthermore, contractors were reluctant to share their failures (could result in lower award fees) and their successes (could give the competition an advantage). Pockets of resistance to sharing information remain within the DOE to this day. Because of lingering security issues at a many sites, sharing information with the public, also remains a concern.

In March 1994 a cross section of DOE employees and contractors interested in establishing a process for sharing lessons learned formed the Lessons Learned Process Improvement Team. That team had an eighteen-month mission to develop a DOE-wide Lessons Learned Program. In 1995 the Process Improvement Team transformed into the DOE Society for Effective Lessons Learned Sharing (SELLS) with a mission to promote and advocate the Lessons Learned Program to DOE and its contractor management and to develop and maintain tools, resources, and guidance documents for effectively sharing lessons learned across DOE. Recently the realm of SELLS has expanded to include businesses and organizations outside the Department of Energy.

Sharing Lessons

The Process Improvement Team developed various publications including a number of Fact Sheets describing various facets of the program (see references), a charter and Bylaws for SELLS, and a DOE Standard. The original Standard provided guidance for establishing local lessons learned programs and protocols for transmitting lessons learned among DOE Sites. It was supplemented with a two-volume handbook of example documents from existing lessons learned programs at various DOE Sites. The Standard has recently been revised to focus on high-level programmatic issues and Integrated Safety Management rather than providing detailed guidance to local programs.

Elements of the original format for lessons learned documents included a title, date issued, a unique document identifier, a priority descriptor, lessons learned statement(s), a description of the event, analysis, and other miscellaneous identifying information. Within a year of initiating the Standard, user feedback caused us to revise the format to move the important information (lessons learned statement, description of event, and analysis) to the top with remaining boilerplate information at the end.

One of the most debated elements in the format is the work function category. Originally, we tried to

mimic the DOE directives classification and numbering system but soon discovered that nearly all lessons fell into the same major category, Operations. Additionally, the subcategories under Operations did not fit our needs for classifying lessons learned. Consequently we developed a more useful list of about 25 functional categories. At the same time, we revised our guidance document to permit locally assigned categories. Finally, in the December 1999 revision of the Standard, we greatly expanded the list of categories to include many more specific work categories identified during five years experience with lessons learned. This list is now used in the DOE lessons learned database as one of four ways to sort lessons in addition to selecting them from a chronological listing. The database search page is accessible from the DOE lessons learned web site (see references for URL).

Electronic Sharing

The Team also developed a number of electronic methods for sharing lessons learned including a listserver (an automated e-mail distribution program) for distributing time-sensitive lessons learned, a discussion forum (bulletin board), and a searchable web-based database of lessons learned. These tools are valuable elements of today's Lessons Learned Program. Many individual DOE Sites also have developed Internet or Intranet lessons learned Web sites. Several examples available on the Internet are listed in the references.

One aspect of the DOE lessons learned process that distinguishes it from most other databases of information is its modified "push" delivery of lessons learned through the listserver. In many information bases, valuable lessons learned go into a "black hole," never to be seen again unless some potential user actively searches for them. In contrast, SELLS encourages Lessons Learned Coordinators to share their lessons with the rest of the DOE by sending them to the DOE lessons learned listserver. The listserver forwards the lessons by e-mail to Coordinators at other DOE sites who then further distribute them to workers likely to need the information. See Figure 2 for a flow diagram showing the process for sharing lessons learned across the DOE.

Obstacles

In addition to the security concerns mentioned above, several other characteristics of human nature cause lessons learned to be less effective than desired.

Distance is one of the most significant. The same event (e.g. serious injury, auto accident, near miss) will impact our behavior differently depending on who is involved and where it occurs. Ranked roughly in order of impact: an event that involves us, one that involves someone we know, one that occurs across town, and finally one that occurs across the country or around the world. Because DOE sites are scattered across the country, workers at the Hanford Site in Washington State appear to be less impressed with a lessons learned from the Savannah River Site in South Carolina than one from their own facility.

Resistance to change causes many new programs to fail. It certainly hampered wide spread acceptance of the DOE Lessons Learned Program. Many employees accustomed to sharing their lessons learned solely by word of mouth were reluctant to participate in a new way of sharing. Fortunately the program was strongly supported by dedicated employees in the field who kept it going through several changes in senior management in the DOE. A strong effort to involve workers in the field, to give credit to those submitting lessons learned, and to show workers how lessons learned can make their jobs easier helped overcome this obstacle.

Most of the present systems for distributing lessons learned are quite effective in getting pertinent information to people who need it. Occasionally, however, some recipients complain that they are overloaded with information (i.e. are receiving too many e-mail messages). Those concerns can generally be resolved by a targeted distribution system in which an individual receives only those lessons he or she needs.

One of the major objectives of the DOE Lessons Learned Program is to prevent accidents. Unfortunately, identifying an accident that didn't happen is very difficult. Accordingly, we have been struggling to find a method for showing the monetary value of the lessons learned program. Even with only a few lessons learned traceable to actual dollar savings, the program has been well received and is nearly universally seen as a benefit to the Department of Energy.

Potential AI Applications

Job planning teams presently must search through lessons learned databases to find lessons applicable to the job they are planning. Intelligent searches for appropriate lessons learned could significantly reduce their workload. A potential design for such a system enhancement could match word patterns in the job description with words in lessons learned titles or could simply match key words in the lessons learned

with similar words in the work description. A more sophisticated search mechanism could even match concepts in the work description with concepts in lessons learned. Such an advance would be a giant step forward from the present practice of sorting and indexing lessons into discreet categories of work, hazards, or priority descriptors. See Figure 1 for a conceptual flow chart of this proposed process.
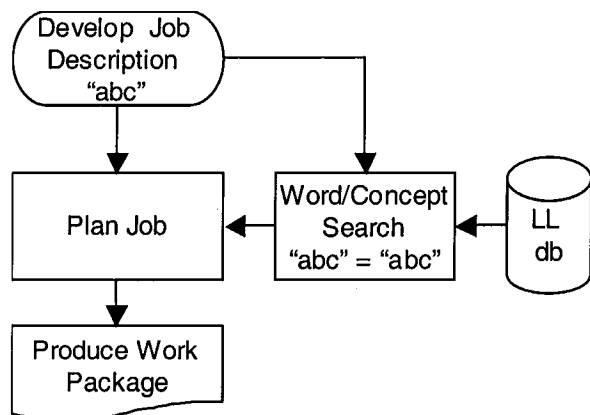
Figure 1 AI Search Concept

A user-friendly system could help alleviate one of the most significant shortcomings with current lessons learned programs – people don't bother to consult applicable lessons learned before beginning a task. This tendency results in many lessons being re-learned. Simplifying and even automating the process for retrieving applicable lessons, will increase the likelihood that people will actually use them in their daily activities.

The collection of DOE lessons learned is relatively small at this point so our present search mechanism is adequate. As the database grows, however, we will need a more efficient way to reduce the effort required to find pertinent lessons. Simple word searches may yield so many matches that the average user will be seriously intimidated by the sheer volume of information he or she must manually sift through. Several sophisticated analysis tools and search engines currently available could potentially help resolve this issue.

National Recognition

With several commercial businesses developing lessons learned programs, SELLS is expanding its membership to include people from outside the Department of Energy. The Port of Seattle, Motorola,

Colonial Pipeline, and the Department of Transportation are some of the entities represented in SELLS. A long term goal of SELLS is to become a nationally recognized professional society.

References

DOE Lessons Learned Web Site:
http://www.tis.eh.doe.gov/ll/index.html

DOE-STD-7501-99, *The DOE Corporate Lessons Learned Program*,
http://www.tis.eh.doe.gov/techstds/standard/std7501/std750199.pdf

Hanford Lessons Learned Web Site:
http://www.hanford.gov/lessons/sitell/sitehome.htm

Oak Ridge Lessons Learned Web Site:
http://qualserve5.y12.doe.gov/IssuesMan/externLesson/externLesson.htm

SELLS Fact Sheets:
http://www.tis.eh.doe.gov/ll/sells/faq.html

SELLS Meeting Report, March 1999:
http://www.tis.eh.doe.gov/ll/sells/proceedings399.htm
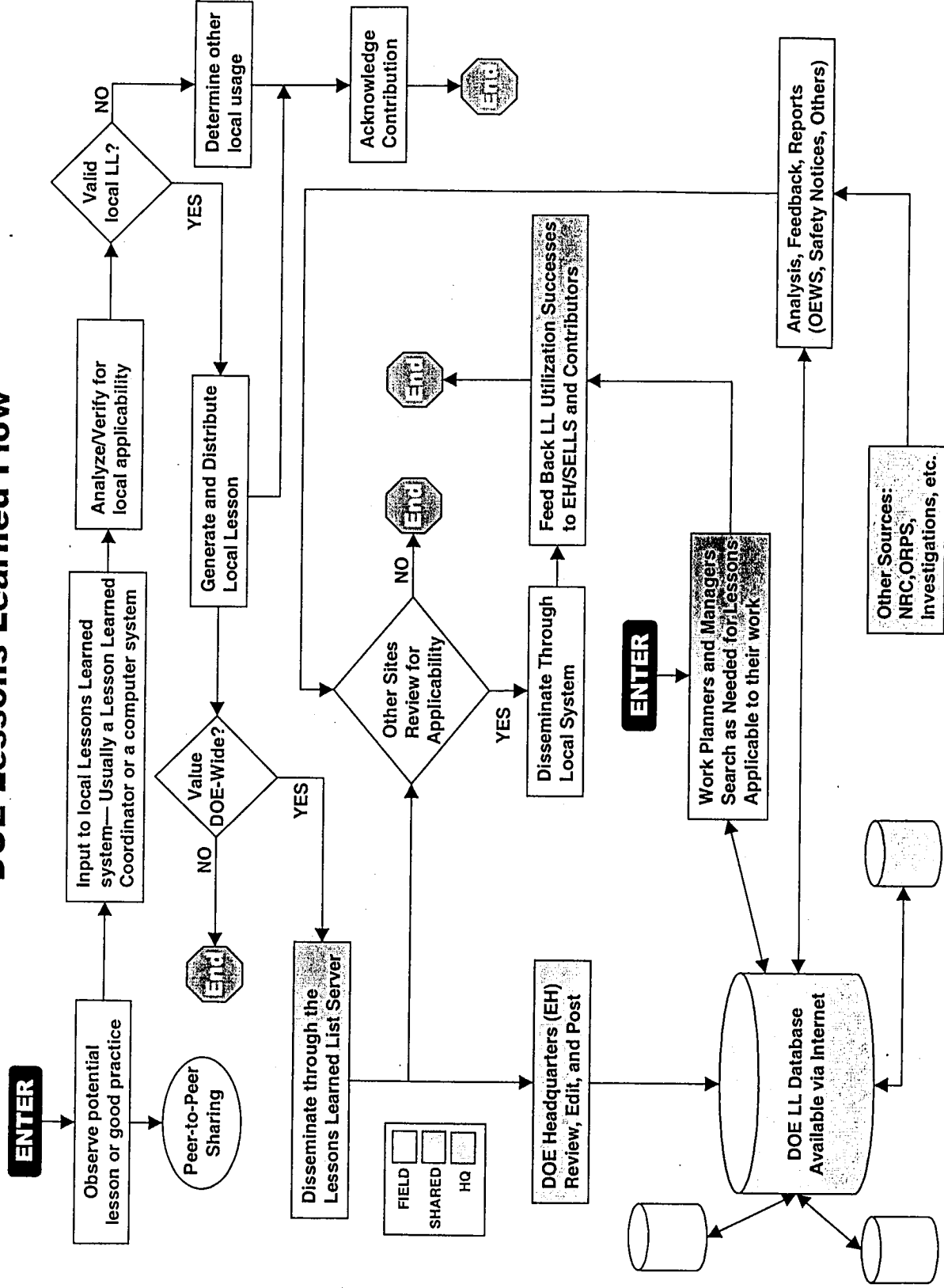
DOE Lessons Learned Flow

Figure 2 DOE Lessons Learned Process Flow

NRC=Nuclear Regulatory Commission ORPS=Occurrence Reporting and Processing System OEWS=Operating Experience Weekly Summary

8