Roadmap for the Joint Center for Lessons Learned

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Abstract

The purpose of this document is to develop an understanding of the components of a lesson learned process and how they fit together from the perspective of the Joint Center for Lessons Learned (JCLL). We also discuss the status of the JCLL, its lessons learned products, and provide a roadmap for what activities JCLL should support, including near- and long-term goals. Throughout we stress the potential utility of integrating appropriate technologies from artificial intelligence and knowledge management to enhance the lessons learned process.

"Lessons are only truly learned when we incorporate them into our planning, doctrine, tactics, and training."
— Ervin J. Rokke, Lt Gen, US Air Force

Introduction

The Joint Center for Lessons Learned (JCLL) is a branch of the Joint Training Directorate of the Joint Warfighting Center that became operational in 1995. Its mission is to collect, analyze, process, and distribute lessons learned, issues, and observations from operations, training events, and other sources to enhance the combat effectiveness and interoperability of the joint forces (JCLL, 2000). Thus, the JCLL must address issues such as deciding which formal methodology to adopt for collecting lessons learned (e.g., Joint After-Action Reports (JAARs)), how to represent lessons in a database (i.e., unclassified lessons on the Internet and also classified lessons on the military's secure SIPRNET), how to publicize information on the JCLL's database and activities so as to promote lesson sharing (e.g., through published JCLL bulletins), and what technologies should be incorporated into JCLL's lessons learned processes.

A foci of the JCLL's efforts is the Joint After Action Reports (JAARs) database, which was developed for its customers (i.e., the Joint Warfighting community). When alerted to deploy a joint force contingency operation, US forces are expected to consult the JAARs database for lessons learned from previous operations that are relevant to their current operation. Currently, 1400 active unclassified lessons are in the JAARs database.

Unfortunately, the software used for JCLL's efforts does not incorporate advances suggested in the knowledge management literature. We address its limitations in this paper, and focus on three types of goals that we believe should be pursued to ensure that the JAARs database will be a useful contribution to the Joint Warfighter's arsenal. First, we discuss immediate goals (1-3 months) that, if accomplished, would have a positive impact on JCLL. Second, we discuss near-term goals (3-12 months) that have a high probability of successfully improving the JCLL lesson learned process. Finally, we describe long-term goals that are required to continue improving the lessons learned process adopted by the JCLL for JAARs. Most of these actions will require the full active support and interest of senior leadership, and would benefit from a knowledge management focus.

We will address the full lesson learned process (i.e., collect, analyze, distribute) for each of these goals to provide a complete picture of the factors that are impacting JCLL both currently and also in the future.

Immediate Goals (1-3 months)

JCLL's immediate goals are to eliminate the limitations of using 1980's X-base technology (e.g., dBase, Foxpro, Access). These goals deal primarily with the collection, analysis, storage and data management of JAARs received from the Joint Service community.

Collection: Receiving JAAR reports

This is JCLL's most pressing immediate need. The Xbase technology currently utilized is manpower intensive. Hopefully we can eliminate most if not all the manual physical movement of data.

The current process works as follows. JCLL staff receive JAARs from combatant commands, the Joint Staff, from each of the armed services, some Department of Defense (DOD) agencies, and some federal agencies (e.g., FEMA). Most JAARs are on floppy disks, although some are received via email, which will become the prevalent method for receiving them. These JAARs are then stored in a JAAR database, and an Excel spreadsheet is created (i.e., containing a record identification number, name of sponsoring command, date received, etc.) to track this JAAR from receipt to disposition. This spreadsheet and the JAAR database is then given to a senior analyst, who must decide how to maintain data integrity. Each

reviewing analyst is given a copy of the entire working JAAR database, although edits can only be made to the senior analyst's copy. Finally, the JAAR database is divided into parts for each reviewing analyst so they can edit their respective parts. Afterwards, these parts are re-combined when the review process is completed.

A more desirable collection process would import the JAARs to a central database, which would facilitate performing the remaining collection and data management processes seamlessly. Also, this process should be modified so that lessons can be collected in any format (e.g., MS Word, AmiPro, Email). This will require storing JAARs in such a way that someone conducting an analytical search (see next section) can understand a document's history and context. These are issues that the JCLL can examine by collecting and storing all of the JAARs that it has received. To organize this information, the JCLL may benefit from using tools provided by the Joint Digital Library System (JDLS, 2000). The objective of this effort is minimize user search time and maximize user analysis results.

To ensure that collection can be easily performed by individuals in the field with no access to a network, WinJIIP (Windows Joint Instructional Input Program), or a similar program, should be used. Furthermore, the capability to provide lessons learned information in dBase format must be maintained, and the collection software must also be compatible with the Joint Training Information Management System (JTIMS) (i.e., because lessons need to be gleaned from the Joint Training community).

Analysis

The purpose of analysis is to organize and evaluate information to identify lessons of Joint Service significance. The desired collection process described above, if implemented, would significantly reduce analysis problems.

Analysts focus on the benefit that JAARs can provide by accurately retrieving JAAR records of interest. The primary attributes of interest in a JAAR are narrative paragraphs, which are all unstructured free text. To accurately retrieve JAAR records, the analyst needs a search tool that can perform full text searches. This capability would also allow JCLL analysts to evaluate information so as to identify lessons of "Joint Service significance," and to meet JCLL's mission responsibilities for disseminating lessons learned to any Joint Service member.

JCLL currently utilizes a commercial program, InMagic, Inc.'s DbtextWork, that provides the ideal set of full text search features. However, data must be put through a data format conversion process and then imported into DbtextWork before analysts can perform full text search..

Each of the three basic analytical processes requires a slightly different set of search capabilities:

1. Joint Service submitted JAAR review process. The objective of this process is to ensure each record's completeness, minimum quality standard, and to identify up to three related tasks from the Universal Joint Task List (UJTL). First, individual JAAR records should be selected for review and editing, if necessary. The system should support several different selection indices (e.g., sponsoring command, UJTL task entries; English phrase contained in narrative paragraphs). Second, the analyst should be able to mark each JAAR record with data management information (e.g., stage in processing, dates of receipt and start of processing stage, record disposition). Third, a completed JAAR record should become locked except by special request to the JCLL system administrator, who could permit a specific person to make changes and then re-lock editing. Fourth, analysts should be able to print selected JAAR records. Finally, the system administrator should be able to easily generate data management reports.

2. JCLL's analysis of JAAR databases and other information repositories. The objective of this process is to identify lessons from any source that is available, and to make identified lessons available to the entire Joint Service Community. Searches will be primarily unstructured text phrase matching searches, requiring a full-text search tool that must support saving the search criteria and results set and then expanding or narrowing the results set if desired.

3. Joint Service member analysis of JAAR databases and lesson learned information repositories. The WWW allows users to access remotely located information repositories. However, existing WWW search features are limited. Currently both JCLL analysts and Joint Service members can search JAAR databases online. Because this database depends on antiquated technology, the probability of a user finding relevant lessons is small. JCLL's information systems analyst should work closely with JDLS systems engineers to identify how to use JDLS tools (e.g., the Ontology Mapping Engine (OME)) to manage documents in the JAARs database, and to develop search capabilities that improve precision and recall for Joint Service members.

Distribution

This sub-process concerns sharing lesson learned information with all Joint Service members. It is the most difficult sub-process to viably accomplish, yet is *crucial* to

all other (i.e., collection and analysis) efforts. It is a common complaint from most "lessons learned" associated organizations that the current process is not achieving the results needed.

The current philosophy being employed in distributing or sharing lessons learned is *"Build it and they will Come"* (Kinsella, 1996) (i.e., from the popular movie *Field of Dreams*). .The problem is, if you don't know it is there, you won't find it. The reason for this is that there is so much information available electronically or otherwise that a user does not have time to sift through all the superfluous information to find the relevant information.

The current methods JCLL employs does provide some benefit, but not anywhere near what is required to ensure the required readiness of Joint Forces in this era of the "Information Age." For an organization to effectively learn lessons, many processes must take place so that the right information gets to the right person at the right time. This requires changing JCLL's distribution philosophy. Instead of organizations building an information entity which information seekers must locate and search to try to identify relevant information, they should instead build an information *fusion* system that users can access anywhere, and which can automatically locate information relevant to a user's interest. We term this concept *user on-demand learning*.

JCLL is providing the Naval Research Laboratory's (NRL) Intelligence Decision Aids Group with lessons learned information on non-combatant evacuation operations (NEOs). NRL is using this information to demonstrate a user on-demand learning capability for extracting relevant lessons learned in their HICAP plan authoring software (Weber et al., 2000). HICAP provides a generic set of tasks that should be considered to execute a NEO mission. It then interactively walks a user through a series of questions to tailor the task list to a given mission. HICAP allows the decision-maker to completely disregard the list or modify it in any way. During plan construction, HICAP prompts users with collected lessons if their conditions closely match the conditions of the plan being constructed for the current mission.

Near Term Goals (3-12 months)

JCLL's near term goals are to complete the evaluation of relevant software tools provided by the JDLS, including the OME, and to implement promising processes and capabilities identified during this evaluation, and subsequent experimentation, that can contribute to JCLL's needs.

Collection

An important objective of this experimentation is to expand the collection of information beyond JAARs. One of the primary obstacles to having a viable lessons learned program is the lack of volume and quality information. One reason for this is that submitting a JAAR requires someone to invest a significant amount of time learning how to use the required JAAR software and then spending the time to input information into the form.

With the capabilities of the JDLS, JCLL can allow operational personnel to submit text versions of the after-action report instead of requiring them to rewrite it in the many pieces that are required to fit in the dBase format of WinJIIP software. Collecting the text versions of a submitter's after-action report reduces their workload and increases the quantity and quality of information for JCLL and, therefore, the Joint Services.

This solves one problem but introduces others: how do we structure the storage of information so that a user can identify and retrieve only the information that they are interested in and need? JCLL perceives the OME as providing great potential in creating an information storage capability that will facilitate and ease the retrieval of relevant information.

Analysis

Hopefully, the capabilities that the OME provides will lay the foundation for satisfying relevant information retrieval requirements. The first step towards retrieving only relevant information is to limit the results of a search to a specific segment of a document rather than the entire document. For example, suppose a user conducts a search using a specific knowledge set phrase (OME and HICAP will facilitate this capability) that yields a result table listing 10 documents as having relevant information. The user must not have to read through all of these documents, which may be hundreds of pages in length, to find the information that caused each document to be retrieved. Instead, the user should be taken to the location in the document in which the phrase exists, although full-text browsing should also be supported.

We anticipate that the search capabilities of JDLS tools will facilitate developing these functions. If these capabilities are not inherent in JDLS, JCLL will investigate using other commercial software products (e.g., Verity, DbtextWork).

Distribution

Further development of tools like HICAP and the distributed information capabilities of the Advanced Distributed Learning Network (ADLN, 2000) are needed to achieve the level of information sharing needed to for effective lesson distribution. The JCLL must remain

involved with the ADLN, and also understand how and where lessons learned information must flow within the ADLN so the right lessons can get to the right person, at the right time. Finally, the JCLL must continue to work with organizations like NRL's Intelligent Decision Aids Group to implement the user on-demand learning concept so they can be effectively integrated into the ADLN.

Long Term Goals (12+ months)

The JCLL's long-term goals are to monitor the direction of the ADLN and ensure JCLL maintains a compatible path. ADLN's notional goal is to achieve communications connectivity between all DOD organizations using the Internet model, and to establish information sharing standards that will ensure all connected organizations can effortlessly share information. *Effortless information sharing* is defined as the process of collecting information DOD wide, while maximizing the number of organizations connected via an internet, so that users have tools that effectively and efficiently allow them to retrieve only the relevant information they need.

Information sharing is a critical capability that must exist before the Joint Services can become a *learning organization* (Senge, 1990) and significantly increase the probability that all Joint Service-related organizations can achieve an acceptable level of readiness.

An idealized lesson learned process

Our long-term goals involve developing an ideal lessons learned process, which involves hundreds, and perhaps even thousands, of organizations that use an active knowledge management process to incorporate lesson learned. We also assume that these organizations are connected in a distributed WWW environment that facilitates unhindered information sharing. Finally, we assume that individuals are exposed, educated, and trained throughout their careers (i.e., from basic training to senior service school) about the principles of the lesson learned process and *the critical part and responsibility each individual has in making it work.*

Unfortunately, this is a description of an unachievable, perfect world because organizations are continually created and dissolved, and completely unhindered information sharing cannot be achieved in an ever-changing world. However, many organizations do share voluminous information, and that sharing is transparently unhindered (i.e., automated security processes work behind the scenes to facilitate the appearance of unhindered information sharing). *Without information sharing, the concept of just-in-time information/knowledge management facilitated by technology will never work to our advantage.*

Collection

One of our long-term goals is that collection of raw information will be primarily automated. As documents are created, they will be evaluated as to whether they should be stored for reuse. If selected for reuse, their content will be automatically categorized and indexed. The document would then be stored in electronic form in a local digital library that is accessible to whomever requires this information. For the JCLL, this means that we could access information that is being collected by all the combatant commands, armed services, and other DOD and federal lesson learned organizations.

These capabilities may evolve from the efforts of ADLN's Distributed Research Library (DRL). Because the Joint Warfighting Center's JDLS is a prototype for the DRL, the JCLL may leverage its experience with JDLS when integrating DRL software in its future efforts.

Analysis

In our long-term vision, analysis is conducted by whoever has the interest and initiative, independent of the subject matter, the analyzer, where they are located, or the time of analysis. Analysts will be using search tools that extract only those documents that are relevant to their search, searching hundreds of (on-line) libraries simultaneously. Instead of searching by using a single word, users will instead search using a *knowledge set* of phrases such as *"air power employment doctrine for denial of flight"* missions. After an analyst completes their analysis and documents it, the documents will be automatically evaluated as described in the long-term collection sub-process (see above). An analyst will be able to conduct one search that accesses all libraries and will return only those documents that are relevant to the search subject. Whenever they complete an analysis, it will automatically be stored so that it is available to all potential users.

The value of any lesson learned or knowledge management (KM) process is derived from a person absorbing information (analysis) and then synthesizing new ideas or concepts. This is learning, and it is the heart and soul of any lesson learned or KM process. Technology efforts should focus on reducing the time and effort required for an analyst to filter superfluous from relevant information. The ultimate technological capability will be achieved when software can profile the user and select information based on the user's background and the context of the user's information search. Although some of these capabilities exist in KM prototypes (e.g., Johnson et al., 2000), none have yet been deployed that support all of these capabilities.

HICAP is one step in this direction for the military because it models a specific mission (i.e., deliberative planning for NEOs). Once it is tested and refined, all 57 other basic military mission types can potentially be modeled using

HICAP. After that, it will be necessary to evaluate available and emerging technologies to determine what capabilities should be developed next.

Distribution

Our long term goal is that distribution will be done from a user on-demand learning perspective. The numbers, types and levels of possible lessons, or other knowledge artifacts, are infinite, which precludes using a single method/pipeline of information to ensure getting the right information to the right person at the right time. School houses, training centers, and many other specifically focused organizations will task individuals to search the ADLN in an effort to locate the most recent, relevant information that will allow them to make the best decisions possible. Military school houses and training centers will need to search the ADLN continuously to provide insight to new concepts so that, when students become decision makers, they will understand how to utilize this information and implement the new concepts. With this scenario, individuals within the Navy Kosovo Staff would have been aware of the USAF *Five Strategic Rings* Air Power concept, employed it earlier, and possibly shortened the operation. (However, this vision disregards the involvement of NATO and the impact of politicians.)

These capabilities will hopefully evolve from the efforts of ADLN. The Joint Warfighting Center's Joint Distributed Learning Center (JDLC, 2000) is a prototype for the ADLN. We hope that the JCLL can take advantage of this and determine how to interface lesson learned processes with elements of the JDLC.

Conclusion

In this paper, we briefly introduced the mission of the Joint Center for Lessons Learned (JCLL) and then proposed its immediate, near-term, and long-term goals from the prospective of wanting to maximally promote information sharing activities. Our vision is one in which knowledge management (KM) plays an important role, that the Joint Lessons Learned System be integrated with other relevant sources using software from the Joint Digital Library System, and that the JCLL will continue to collaborate with other lessons learned organizations and research organizations committed to developing active lessons distribution processes.

Although most of these near and mid-term goals involve low-level objectives that do not require artificial intelligence (AI) techniques, several of these longer-range objectives specifically target the incorporation of state-of-the-art AI and KM techniques to enhance the lessons learned process in the Joint Lessons Learned System. These will include elicitation procedures for collecting lessons, digital libraries for providing access to additional sources of information, and active distribution techniques for providing lessons upon user demand.

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