

Maintaining the Corporate Memory

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Abstract

It is a well known fact that corporations don't have memories. This is because the majority of the knowledge is maintained in the employees' heads and when they leave that knowledge walks out with them. This continues to be the bane of process safety as errors get perpetuated and incidents repeated. A system can be created, though, to form and keep a corporate memory by accumulating the knowledge as it is developed and saving it in an organized manner, to be easily found and used by others as needed. In a previous paper we saw how knowledge can be organized. In this paper we will show that knowledge is best shared by example (for instance, we would like to design our plant based on the best applicable designs available), and how it can be continually collected with little effort once a proper work flow has been adopted. In this workflow the knowledge is reviewed and indexed as part of the collection process and organized into the niches of a previously created framework. The resulting knowledge infrastructure serves as the corporate memory and besides being a boon to process safety, it becomes an efficiency machine (no more need to reinvent the wheel!).

The Missing Corporate Memory

Why don't corporations have memories? Because the knowledge that is available from experienced employees never gets properly preserved. These employees eventually leave, either because of retirement or transfer or promotion to other departments where the accumulated knowledge is no longer needed or at least not needed in its present form. Companies do try to pass on the knowledge of the experts through mentoring programs, but these, even if successful, apply to starting engineers and are meant only to ease the transition of an employee from a starting position to a functioning worker.

Memory loss becomes more acute as companies try to get lean and flatten their organizational structure. In the past the organization had functional groups with an experienced leader whose job was more technical than administrative and served as the funnel of the technology needed by the group. This level in the

organization disappeared leaving an overworked superintendent who didn't have the time to mentor the large number of people now reporting to him.

Why is a corporate memory important? Because it is the set of practices that have been learned through time, sometimes the hard way, and that gives the company that special edge that makes it more competitive. In the process safety arena these sets of practices amassed from experience are more critical since the room for error is much smaller.

Knowledge vs. Information

With the advent of the personal computer, companies for the most part became adept at preserving information. But the ability of applying this information to the appropriate task (i.e. the knowledge of how to do things) faltered. Even in the cases where there was an experienced person ready to use the information, that information was missing or wasn't easy to find.

As technology has advanced two important effects have resulted in increased loss of memory. The first is the acceleration of change which brought about more dynamic organizations and less time to stay in one position and learn or transmit knowledge. The second is the creation of vast amounts of information, aided by fast computers and almost unlimited storage, which requires even more knowledge in order to sift through it and find the correct and useful piece of information. Sophisticated search tools such as Google and Bing tend to lead us astray as the information is presented in a quantity and an order that may be of little relevance to the need. This takes then even more of our time to sort through the information or even worse, forces us to grab the immediately available without consideration to the correctness of the information.

Thus, we need knowledge to use the information that is supposed to give us more knowledge. And we may have nobody to tell us.

Acquiring Knowledge

It is important to realize that how we learn things is basic to maintaining knowledge. If we could write the perfect book on a subject, theoretically we wouldn't need universities. The reality is that nobody can write the perfect book and even if we could, it would not only be obsolete by the time it got published, but we couldn't dedicate the required time to read and understand it. And that is only one subject. Thus, textbooks and training materials are only vehicles for learning and we need a person that has already learned the subject to help us understand it. A formal or classroom environment is not necessary for this purpose.

Since as we discussed previously, resources are limited and we can't have somebody training us all the time (there are also limitations on this subject) we

need to find a better way to learn. People learn best by example. We get trained on the fundamentals but it requires examples to enable us to convert the training into practicality. We want of course the best examples, those of experienced peers.

Capturing Knowledge

We need then to capture the best examples of designs and applications that the company has. Since technology keeps changing we need to do this on a continuous basis. This requires good documentation and a repository that allows us to store and easily retrieve the documentation. At this point we assume that the repository has been prepared following the organizational structure. The requirements and organization of such a repository are shown in another paper [Chosnek 2008] and are crucial to have in place before establishing a workflow for knowledge capture. The tool for that repository is a Document Management System (DMS) which more and more is being called a Content Management System (CMS) to reflect the great variety of existing document types which may include text, graphs, pictures, sound clips, videos, computer-based training, etc. Understanding the function of the repository is necessary for understanding the reasoning behind some of the details of the workflow.

By defining these requirements we can have the elements of the necessary workflow:

- Documentation
- Critical review
- Enabling the documentation for retrieval
- Publishing

This workflow becomes the essential tool for corporate memory retention.

Documentation

As part of becoming lean, many companies have relaxed their documentation practices. This can lead to accelerated corporate memory loss since good documentation is not only essential to knowledge retention but the only effective starting point. In order to reduce the time spent on documenting designs, a template may be created to facilitate the report. This template of course would reside in the Knowledge Repository (KR) and will be helpful in other ways as described later. It is important as part of good documentation not just to document a design but to include the objective of the design and all the assumptions made. This is the only way that the future reader of the report will be able to learn rather than copy by rote.

Besides the current reports that are created there is other documentation that needs to be gathered or generated. The company's policies and procedures embody codified processes, methodologies, regulations and behaviors that it wants us to follow and they should be an integral part of the company's documents. In addition best practices and engineering practices and standards

used by the group or by the whole company need to be included. This last item may not be available and generally will not be explicitly included in the design reports but because of its value, may justify additional efforts.

Compilations of best practices and standards used by the company or by the different groups should be commissioned. These would be electronic manuals for example a Process Engineering Manual, a Process Safety Manual, or a Technology Manual (a technology would be for example the manufacture of ethylene oxide). These manual would not try to replicate existing textbooks or resources but would be specific applications of existing principles or standards. The manuals would be a collection of relevant documents linked to an index.

Since getting experts to document their expertise is a difficult proposition because of lack of time or a misguided sense of losing their expert status by divulging their expertise, incentives need to be offered by the company. Some of these incentives may be allotted time for this purpose, higher status, formal recognition of their written contributions, or actual fringe benefits. In any case, every document should be signed by an author who will have the recognition for the specific document. This also applies to the parts or chapters of any manual that gets developed.

Since we have the tool, the Content Management System (CMS), we also use it for the documentation process. A secure area in the CMS will exist for each working group where its members can develop drafts of their reports. The author automatically becomes the owner of the document and can set its security to allow or forbid others to view and/or edit the document. In this way collaboration between people can be accomplished or plain feedback obtained. Once the document is in its final shape it will only take changing a security switch to make it available to the reviewer which is the next step in the process.

Critical Review

Since any document introduced into the KR will be part of the corporate memory, it behooves us to have the correct information. The accuracy of the content of reports or any other documentation should be carefully reviewed. The emphasis here is more on the technical content than on the structure or format of the document. This process should be formalized with the signature of the reviewer, whether it is a peer reviewer or a supervisor. Although Engineering firms have such a process for external clients, they may not have it for internal clients (i.e. other groups in the organization). Operating companies tend not to have a formal process, or even if it's formal, the review tends to be perfunctory due to lack of time and/or resources.

The danger of not having a critical review is the introduction to the KR of information obtained from unreliable sources, which are very easy to come by. Even professionals tend to rely on unproven information resulting from a web search, mainly because of the huge amount of information obtained and the

amount of time that would be required to sift through it and verify it. By having reviewed documents in the KR the probability of have incorrect or irrelevant information is greatly diminished, the time savings are significant, and the opportunity for making mistakes rapidly decreases.

Prepping of the Documentation

Actually because there are such excellent search engines that examine the complete text of a document we run into problems of finding the correct information as mentioned above. Although we will have a much smaller universe of documents in our KR than we have in the web, their subject is much more uniform since it is the business of the company. Thus again we may find too many documents in our search, defeating the goal of having to spend very little time finding the correct document.

How do we solve this problem? By using the features of the tool for the KR, the Content Management System (CMS). One of the important features of this system is the ability to add metadata (data about the document) to any document in the form of keywords. This is much like using the Properties in Microsoft Word except that this metadata is searchable by the CMS. The metadata allows us to zero in to the desired document. We can do a combined search of metadata and full text search to come up with a unique document.

This doesn't come about easily. Consider for example a refinery whose product is gasoline. The references to gasoline in the refinery's documentation are going to be in the many thousands. Even if we narrow down the search to look for hydrotreatment we will may have too many. We may be searching only about the safety of hydrotreaters but then the word safety may not be in the text of the document. The allusion to safety may be in the form of overpressures, tube failure, high flame temperature, etc. but the word "safety" might have not been mentioned. It all depends on how the author of the document described the problem (or the solution). Here comes the metadata to the rescue since the word "safety" was included in it in spite of not being in the body of the text.

Adding the pertinent metadata to a document is a learned skill. The person doing that needs to be familiar with the technology and business of the company and understand how people look for information. The importance of this function is being mentioned more frequently by knowledge management professionals and even a new word has been coined for it: *metator* [LeBlanc 2009]. When writing a document two people may describe the same process with different words. Take for example a distillation tower. It is referred sometimes as fractionation, separation, purification or impurity/heavies/lights /bottoms removal combined with one of the words tower, column, still or equipment. This complicates our search. One way to solve this problem is to provide a list of company approved keywords. This list could be included in the documentation template that was discussed before. The list should be of course readily accessible and searchable for the approved synonyms.

Publishing

Publishing consists simply of moving the document from the author's or reviewer's workspace to the CMS. This is the easy part of the workflow. It involves saving the document to the CMS, entering the metadata and of course the document title and author's name. One person should coordinate this activity for the company to avoid mistakes and to ensure that the proper security is given to the document. Once the document is published in the CMS the author loses its ownership and cannot change it. If the document is retrieved and changed a new version is automatically created. Of course the creator of the new version has to have the proper security privileges in order to do this. The latest (approved) version will be the one found when searching for the information.

Finding the Knowledge (“Remembering”)

Finding the necessary information should now be easy by doing searches of the keywords with the optional combination of a full text search, or just by browsing through the folder structure of the group or department that creates the type of knowledge we are interested in. We need to be aware that some of the information that we are looking for may be hidden on purpose for confidentiality reasons (e.g. management's bonus plan). That is, some of the information may not be available or even its title visible to some groups. This can be exploited for example to make process safety information available to contractors while denying them access to confidential technology or trade secrets.

Maintaining the system long term requires a small cultural change and a small adjustment in work methods. There isn't a vast difference from current practices in most companies. Once the knowledge workflow is established and it is no different from the regular, day-to-day workflow, the company will have attained a corporate memory, reaping great benefits at a very small cost.

REFERENCES

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