EMIS: A Seamless Web Exchange for MSDSs

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Abstract

As more companies turn to computer systems to streamline their Environmental, Health & Safety information management functions, the process of initially populating the databases becomes a daunting task. Furthermore, keeping the database current and accurate requires an ongoing commitment of time and money. For those charged with EH&S responsibilities within a facility, nowhere is this more evident than the task of collecting Material Safety Data Sheets (MSDSs) and entering them into your system. Not only is this task expensive, turnaround is usually slow, and the process is prone to errors.

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Executive Summary

The management of Material Safety Data Sheets creates a significant burden on both the product manufacturer who authors the MSDS, and the employer, the end user of the MSDS. Using current technologies and established open standards, the communication of MSDS information can occur *quickly*, *accurately* and *inexpensively*.

A brief history of the MSDS

Material Safety Data Sheets are documents that provide information on characteristics, storage and handling requirements, and human health effects of hazardous chemicals. MSDSs originated in 1983 as tools for fulfilling the Occupational Safety and Health Administration's Hazard Communication standard, which requires facilities to provide MSDSs to workers when hazardous chemicals are used or stored at a facility.

OSHA established the 9-section format used today, and loosely specified the contents of each section. Soon after, other organizations created variations of the OSHA format.

- ANSI created a 16-part Z400.1 format, in place in 1993. (The ANSI format is still a voluntary standard.)
- Canada and the European Union added their own specifications to the MSDS format.

By default, the distribution media for these documents was paper.

Since its initial creation, the role of the MSDS has expanded significantly. The data provided on an MSDS is now a cornerstone of environmental compliance and reporting. MSDSs provide the material component information used in SARA Title III reporting (Tier and TRI). Emergency responders rely on MSDSs to provide instructions for hazards, handling information, and first aid treatment in the event of spills, fires or accidents. Healthcare workers use MSDSs as a primary source of information for potential exposure.

MSDSs in Perspective

- First, this paper will briefly examine the evolution of MSDSs, the problems encountered - both from the employer's and manufacturer's standpoint - and the various systems implemented to address these problems.
- In the next section, the paper will review the challenges posed by the evolution of the MSDS process.
- Then we will define the desired characteristics of a solution, examine some of the available technologies, and propose a real-world solution.
- Finally, we will demonstrate an implementation of this solution.

Traditional Approach

By OSHA regulation, a manufacturer is required to provide to an employer that purchases its products an Material Safety Data Sheet for any product that could pose workplace hazards. In turn, the employer must make these available to its employees as a means of informing them of the potential hazards associated with a product and its use.

Traditionally, the manufacturer, after compiling the appropriate data, will create a paper document, the MSDS, using traditional document authoring tools, such as a word processing application.

These paper MSDSs are initially physically delivered to the employer through the product distribution channels. Additional copies of that MSDS may also be delivered to the employer through mail or fax methods.

On the other end of the MSDS distribution chain, the employer assembles the appropriate MSDSs into binders. These binders are then made available to the employees.

This approach may still be suitable for certain situations, but has some significant deficiencies.

Even when employers elect to use the traditional paper-based method to comply with OSHA Hazard Communication requirements, creating the MSDS binder is only the first step. Ongoing maintenance adds significantly to the employer's burden. The employer must also ensure that he obtains and catalogs any revisions to existing MSDSs, as well as add the MSDSs for all incoming new products into these binders.

These problems are further compounded for large employers, requiring many MSDS binders.

Large quantities of MSDSs further exacerbate the burden. (*Figure 1*)

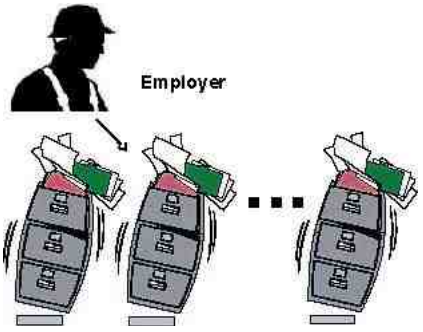

Figure 1

Computerize MSDS management

In the mid-to-late 1980s, many organizations implemented computerized MSDS management systems. Whether developed in-house or purchased "off-the-shelf", these computer applications typically included tools such as worker viewing stations.

By providing worker access terminals, one copy of an MSDS can be made available to a large workforce. This eased one aspect of the compliance burden because the employer then had only a single copy of the document to maintain for all employees. However, in addition to employee

access for OSHA compliance, access to MSDS *data* must still be available to emergency response personnel and those tasked with environmental responsibilities.

Employer's Integrated Solution

This data requirement has resulted in the evolution of integrated Environmental Management Information Systems (EMIS) that rely on a database containing MSDS data, not text. These systems typically combine environmental management and reporting capabilities, along with employee access to MSDSs. (*Figure 2*)

Before the MSDS data is available in computerized format, it must first be entered into the EMIS. Whether done in-house or contracted to a data entry service, manually entering this MSDS data has some pitfalls.

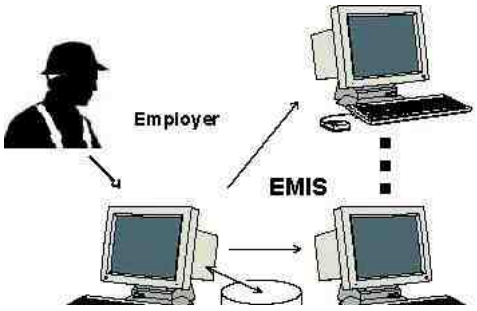

Figure 2

For example, entering both initial MSDSs and revisions is expensive. Organizations report that typing an entire MSDS into an EMIS may take from 45 minutes to 1 ½ hours. Revisions may take 15 minutes. Typically, this data entry is done by clerical staff who have to make decisions which may affect the integrity of the data, in addition to typing errors.

To mitigate the time consuming nature of this activity, MSDSs are often entered in batches, resulting in delays from the time the MSDS copy arrives at the plant until it becomes available to the EMIS user.

The process of obtaining new MSDSs and revisions to existing MSDSs is further complicated by the different distribution channels used by the various manufacturers.
The solution, from an employer's standpoint, would be to replace manual data entry of MSDSs with a direct, and preferably automated, data link to the manufacturer. (*Figure 3*)

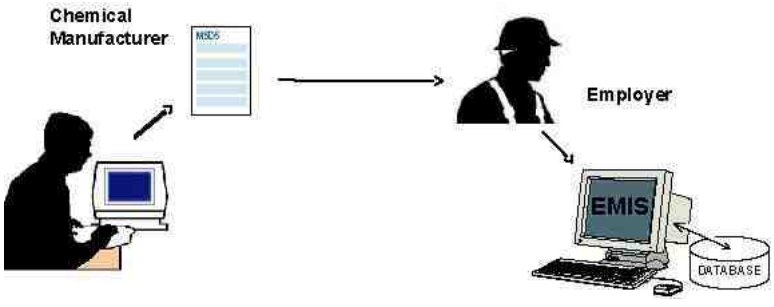

Figure 3

Focus on the Manufacturer

The Manufacturer of the MSDS has its own issues resulting from OSHA compliance responsibilities.

The Manufacturer's issues can be broken into two categories:

- MSDS authoring and revisions
- Distribution of the MSDSs

MSDS must initially be created or authored. Any changes to the MSDS content, from a product reformulation to a simple telephone area code, must be made to the MSDS, and distributed to all customers that have purchased that product.

Distribution media includes paper, fax, and more recently, email and posting on the manufacturer's web site.

Some additional issues faced by the manufacturer include:

- Batch MSDS production for distribution with the product, and on-demand distribution at the request of the customer.
- Production of MSDSs in alternate formats, especially for products shipped abroad.
- MSDSs in alternate languages, both for US clients and customers abroad. For example, Canadian customers may require MSDSs both in English and French.

Manufacturer's Solution

Most of these requirements can be met by existing MSDS authoring software packages. The element that has been missing is the direct data link to the Employer's EMIS package.

To relieve the Employer of the problems associated with data entry of MSDSs, we are faced with the challenge of providing a systematic means of transferring MSDS data from the MSDS creator to the end user. The method must be consistent from manufacturer to manufacturer and based upon a non-proprietary format and transfer mechanism to support multiple EMIS vendors.

Our next focus is to perform a closer review of the desired characteristics of such a system:

- The systematic means of transferring MSDS data from the MSDS creator to the end user should be *consistent* and *reliable*.
- The process should also be *easy to learn*, and *easy to use* – preferably operating as an extension of currently familiar systems.
- The system should be *timely* so that the data can be obtained when it is needed and so that updates can be easily integrated.
- The system should be *non-proprietary* to promote acceptance in the industry.

- It should operate independent of the chemical supplier, independent of the EMIS, and independent of the transfer mechanism.
- The system should be secure, both from the standpoint of maintaining data integrity as well as insuring that access to proprietary data is restricted to those authorized to access it.
- It must be able to accommodate the future data exchange standards and requirements.

Enabling Technologies

Although the need for this electronic exchange of data has existed for many years, until recently, the various components were not available to make it happen.

In the last decade, the Internet has become a familiar part of our lives and one of the main means to communicate information business to business.

Microsoft's extensible markup language (XML) has become the de facto standard for communicating data over the Internet between dissimilar databases and systems.

Most recently, an XML-based standard for exchanging MSDS data was developed by Department of the Defense (DoD) and other standards organizations.

Consolidated, these three technological components fulfill the requirements of the ideal MSDS data exchange system.

Solution: An Internet Portal that Facilitates the Exchange of MSDS data

The solution that we propose is to use a web site as a portal for the standardized exchange of MSDS data between the Manufacturer and the end user, the Employer. Based upon non-proprietary standards, data can flow between dissimilar MSDS authoring systems and EMIS packages. Additionally, employers that still require hard copy MSDSs are accommodated. (*Figure 4*)

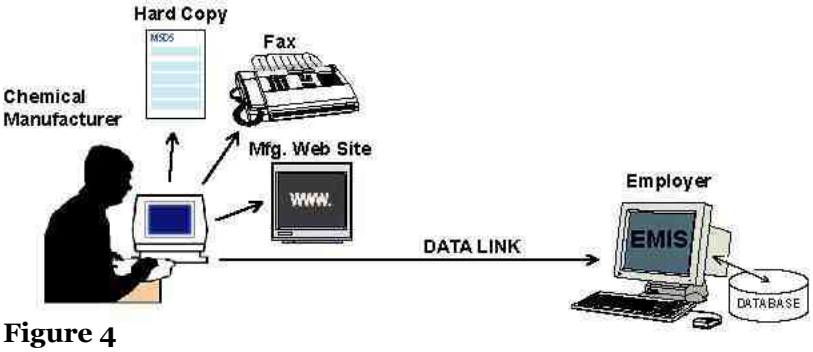

Figure 4

In this solution, the Chemical Supplier still retains MSDS authoring and revision responsibilities. The Chemical Supplier uploads MSDS data to the Internet Portal. The Internet Portal provides storage of MSDS data and access to users of data. Users access the Internet Portal via standard

internet tools or direct automated links provided by their EMIS. And finally, all MSDS data is exchanged via open vendor-independent protocol. (*Figure 5*)

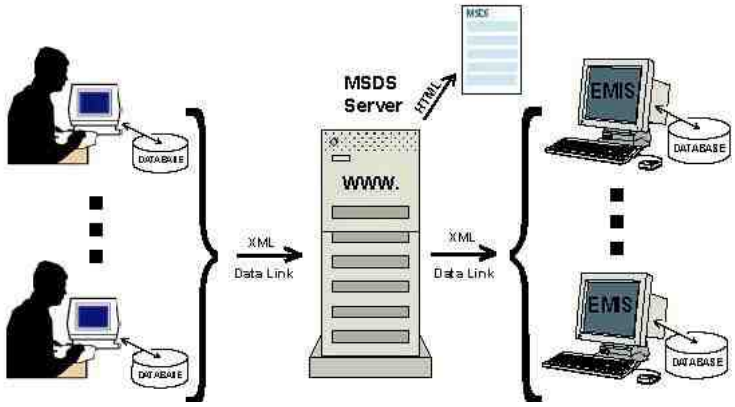

Figure 5

Technology in Action – The Chemical Supplier

With the advent of enabling technologies, such a system now exists. During our presentation, we will demonstrate the system from the viewpoint of the manufacturer. We will revise an existing MSDS, create a new MSDS and upload them both to the web portal for distribution.

Technology in Action – The Basic User

This MSDS web portal will also have tools to satisfy the casual user of an MSDS, as well as the data exchange capabilities needed for the EMIS user. The web portal will allow an individual to search for MSDSs, and to view or print those MSDSs.

Next, we will demonstrate the ability to search the site using a standard browser to access MSDSs and MSDS revisions. With the ability to print an MSDS, the needs of a hard copy user are met.

Technology in Action – The EMIS User

And finally, we will demonstrate the ability to search and download new MSDS data directly into an EMIS package.

We will also demonstrate the ability to automatic update of an existing MSDS that has been revised by the manufacturer.

Additionally, we will show how this data can be used to produce a required EPA report.

Benefits

The benefits achieved by this approach are numerous:

- It creates a single source for all MSDSs
- The process is easy to use and simple to learn. It is an extension of already familiar applications, such as an internet browser.
- The system is very timely. It takes only minutes to revise an existing MSDS, create a new MSDS, distribute them through the web portal and the data to be integrated into the employer's EMIS.
- This solution provides significant cost savings. By eliminating manual data entry, costs are reduced by an order of magnitude. It improves data accuracy by eliminating data entry mistakes as well as erroneous judgment calls by the data entry staff.
- Because the system is non-proprietary the user retains his or her ability to switch MSDS authoring packages and EMISs.
- Using current technologies and established open standards, the communication of MSDS information can occur quickly, accurately, and inexpensively. During our presentation, we have demonstrated an implemented solution to accomplish this objective.
- Issues of security and access control are addressed in the system design, as well as the ability to accommodate new standards as they evolve.

The system can be further expanded to provide additional capabilities in the future, such as the ability to transfer Certified Product Data Sheets (CPDS), Technical Data Sheets (TDS), and other related documents.

This technology could also be easily adapted to provide multiple formats of the same MSDS, where the Chemical manufacturer uploads a superset of XML-based MSDS data. The exchange site would create separate views of the MSDS to satisfy ANSI, OSHA, EU, and other formats.

Other future capabilities include:

- "Push" technology for updates.
- Industrial "UPC" for product identification.
- Auto alerts.
- Automatic translations to other languages.
- Style sheets provided to allow a Manufacturer to include branding elements, such as a logo, on the viewable MSDS.

Conclusion

As this paper has demonstrated, a mechanism to transfer MSDS data directly from the MSDS author to the MSDS end user offers significant benefits, specifically time-savings, increased accuracy and timeliness. These aspects all contribute to both a company's bottom line, and more importantly, enhance employee safety and emergency response effectiveness.