

Selecting a Commercial EH&S Management Information System

Control # 115

Prepared by Jill Barson Gilbert, QEP

President, Lexicon Systems, LLC, P.O. Box 890433, Houston, TX 77289-0433

JBGilbert@Lexicon-Systems.com

ABSTRACT

An organization may find that it has purchased inappropriate software, because it failed to focus adequate resources (time, money) on the selection project. Selecting the right business application is an involved and time-consuming process. This case study describes how one company selected environment, health & Safety (EH&S) software. The Company requested assistance to identify commercial software to automate four business processes corporate-wide—Compliance Management, Task Management, Incident Management and Document Management—for 150 users in over 100 facilities spread over several states.

The software selection effort employed a business analysis-based methodology to enable the project team to understand the impacts of the proposed software on the organization. The technical approach involved gathering data on commercially available environmental software packages using knowledge of the software and the EH&S market, contacts within the software companies, and readily available data. The project team evaluated software solutions on five criteria: 1) alignment with business needs, 2) alignment with information technology (IT) standards, 3) vendor characteristics, 4) deployment issues, and 5) total cost of ownership.

EH&S software vendors have developed a new generation of Web-based products that better align with market needs. Today's web-based systems require little or no client software, thus reduce ongoing maintenance to the client desktop environment. The software applications provide a variety of features and price ranges to fit different needs. The total cost of ownership of an EH&S software solution includes many factors beyond the obvious software license and support fees, and these factors must be considered during the selection process.

Finally, this paper provides tips for selecting commercial EH&S software.

INTRODUCTION

An organization may find that it has purchased inappropriate software, because it failed to focus adequate resources (time, money) on the selection project. Selecting the right business application is an involved and time-consuming process. Projects that follow a business analysis-based methodology have a much higher success rate and are more likely to meet user expectations. By investing the time to plan and select against defined

goals, a company can minimize potential project risks and maximize the opportunity for the project's success.¹

A business analysis-based methodology enables the project team to fully understand how implementing the software impacts organizational goals and business processes. It can help to:²

- » Ensure the appropriate resources (budget, project sponsors, and project team) are dedicated to this critical decision
- » Manage expectations through the identification of managerial, functional, and technical requirements
- » Recommend improvements that could strengthen current business processes
- » Ensure the chosen tool set integrates well with existing environments.

This case study describes how one company selected environment, health & Safety (EH&S) software. The Company requested assistance to identify commercial software to automate four business processes corporate-wide—Compliance Management, Task Management, Incident Management and Document Management—for 150 users in over 100 facilities spread over several states.

APPROACH

The technical approach included gathering data on commercially available environmental software packages using knowledge of the software and the EH&S market, contacts within the software companies, and readily available data. Lexicon Systems, LLC requested data from eleven vendors and evaluated software solutions on five criteria: 1) alignment with business needs, 2) alignment with information technology (IT) standards, 3) vendor characteristics, 4) deployment issues, and 5) total cost of ownership.

A cross-functional team comprised of EH&S subject matter experts, IT experts, business, management and law department representatives provided input to the software evaluation and selection process. Key stakeholders agreed upon business needs and evaluation criteria up front, and then used a weighted scoring system to evaluate the commercial software packages.

METHODOLOGY

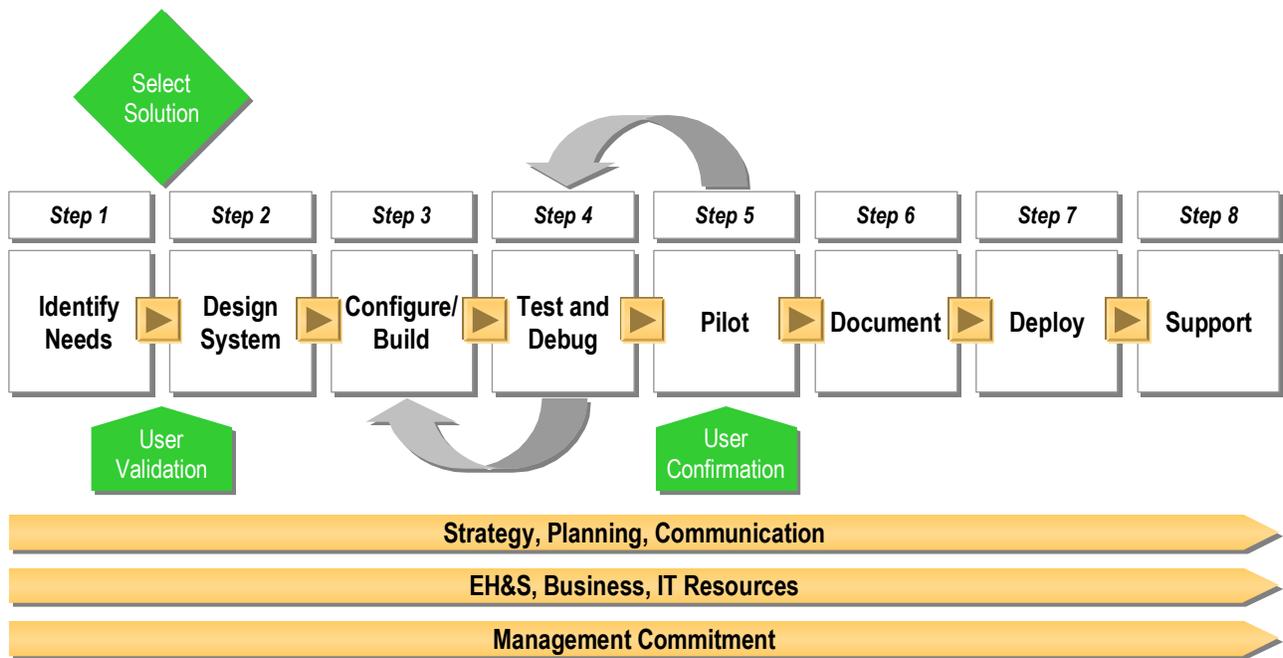
Put things in perspective

The commercial software selection was a component of a business analysis-based systems methodology. This Systems Life Cycle methodology covers the time from concept to design and implementation to ongoing maintenance and support (Figure 1). Before the Company began the commercial software selection, it first conducted a Needs Analysis (Step 1). The resulting Business Requirements Document sets limits for the software selection, allowing the Company to focus on immediate and near-term needs while considering future needs.

The software selection (diamond between Steps 1 and 2) then provides the basis for the design and configuration of the software, i.e., how the commercial software will be configured, populated with data and integrated with other systems (Steps 2 and 3). Testing, pilot and documentation (Steps 4, 5 and 6) occur before final deployment to the user population (Step 7). Finally, the system must be supported and maintained (Step 8) post-deployment. Once the system is deployed, the system typically requires adjustments and the users desire additional features and functionality beyond that identified in the initial Needs Identification. Thus the cycle repeats to meet these additional needs.

Three essential elements provide a stable foundation for the Systems Life Cycle methodology. These are strategy, planning and communication; involvement of a cross-functional team of EH&S, IT and business representatives; and senior management commitment.

Figure 1. Systems Life Cycle



Narrow the field

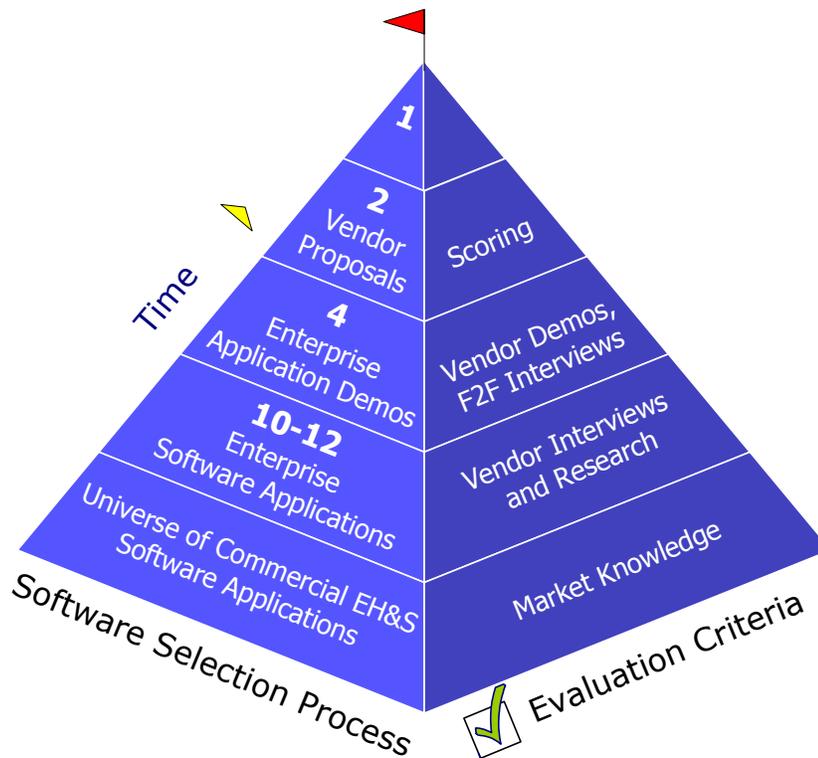
The team employed the following process to select the commercial software package (Figure 2):

1. The first step was to narrow the field from the universe of hundreds of commercial EH&S software applications to 10-12 vendor solutions, based primarily on knowledge and understanding of the EH&S software market. The eleven commercial solutions that were evaluated each addressed multiple EH&S business processes.

2. The second step involved interviews with eleven candidate vendors (one of the twelve did not respond), research of available data on the software solutions, and documentation of findings in an Access database. The output was an evaluation report and summary data sheets for each vendor.

The consulting team worked with the Company to further narrow the field to four vendor solutions, all of which appeared to meet 80 percent or more of the business requirements, regardless of cost. Two of the nine vendors were quickly eliminated because they lacked broad EH&S functionality, one because it offered limited environmental features and one because of its IT specifications.

Figure 2. Software Selection Process



3. In the third step, each of the four candidate vendors was invited to present a two-hour software demonstration to key stakeholders, which included EH&S subject matter experts, information technology (IT), business unit and management representatives. Each demo attendee completed a questionnaire designed to evaluate the software based on the Business Requirements Document and to gauge the person’s potential use of the software.

Each software vendor also had the opportunity to make a presentation and/or have a discussion with a smaller group of business, EH&S and IT representatives. The vendors could discuss the strengths of their software solution, the software installed base, their company and its culture.

It was difficult to narrow down to two finalists. The Company sent two vendors a Request for Proposal based upon the software demonstrations, review of the evaluations and a general analysis of the gaps between the software capabilities and the business requirements.

4. Finally, a combined team of business, subject matter and IT experts scored two vendor proposals based on pre-established criteria:
 - » *Alignment with business needs*—alignment with immediate and near-term needs identified in the Business Requirements Document, as well as alignment with anticipated future needs for additional EH&S features and functionality.
 - » *Alignment with IT standards*—ability for the commercial software solution to work within the bounds of the Company’s standards for user access and security, database platform, system architecture, access to the software via the Internet, etc.
 - » *Vendor Characteristics*—the ability for the vendor to deliver a usable software solution in the desired time frame, with the appropriate responsiveness and support. The ability for the vendor to work closely with a cross-functional team of in-house subject matter and IT experts was important.
 - » *Deployment issues*—the proposed deployment (implementation) approach, methodology, project team and qualifications to conduct the implementation. Also the perceived ability for the vendor to deliver a usable solution while minimizing project risk, the perceived ability for the vendor staff to work well with the project team, their responsiveness and other factors.
 - » *Total Cost of Ownership*—includes first year and ongoing fees for software licenses, maintenance and support, quoted 1) for a client/server deployment inside the Company’s firewall and 2) for a “hosted” application using an Application Service Provider (ASP) model. Also includes the estimated cost for the vendor to configure, populate and deploy their solution, including items such as interfaces with Company e-mail, human resources data warehouse and work management systems. Further, the Company estimated the cost for additional hardware needs, the use of internal shared services staff and the use of consultants needed to manage and/or support the implementation.

Each member of the proposal evaluation team provided his or her evaluation using the weighted scoring system (Table 1).

Table 1. Proposal Scoring System

Evaluation Criterion	Weight
Alignment with Business Needs	30%
Alignment with IT Needs	25%
Vendor Characteristics	20%
Deployment Issues	15%
Total Cost of Ownership	10%
Total	100%

FINDINGS

Overall Fit

Each of the nine vendors that agreed to an interview in the first phase of the selection process had elements that fit well with the Company’s current, near-term and future needs. However, a vetting process was required to find the package with the best overall fit. Narrowing the field to four candidate packages, then to two, resulted in a much better overall alignment with business needs and IT standards. It also greatly reduced the amount of work required by both the project team and the vendors related to gap analysis, preparation and review of proposals.

Alignment with Business Needs

EH&S software vendors have developed a new generation of Web-based products that better align with market needs. All of the evaluated packages appear to have the required Compliance Management, Task Management and Document Management features. Some of the commercial software packages were eliminated in the first round because they lacked certain critical features.

Alignment with IT Standards

The Company’s IT standards included Microsoft .NET Web services, an Oracle database back end, Lotus Notes collaboration tools and a Windows 2000/Windows XP desktop environment with Microsoft Office. The Company also desired to have the software installed on their servers, behind the company firewall.

Of the twelve companies contacted, nine provided sufficient information to evaluate their software. Here is how the systems aligned with the IT standards:

- » All of the software could be accessed using a Web browser. Some systems were fully accessible through the Web, while others had “power-user” features accessible through a typical Windows interface. All of the systems required little

or no client software, other than desktop software/viewers to open and view word documents, spreadsheets and scanned images.

- » Two used Lotus Notes architecture, two used Java and several used Microsoft .NET. While .NET architecture is desirable to the Company in this case study, open technologies should allow the use of systems built on other Web platforms.
- » Two of the vendors used IBM Lotus Domino/DB2, and the others used Oracle, MS SQL*Server, or were database-transparent, allowing the Company the flexibility to use different database engines.
- » All nine systems appeared to be compatible with the Company standard desktop environment of Windows 2000/Windows XP, though integration with Lotus Notes calendar features might pose a challenge.
- » Five of the nine systems offered “hosted” Application Service Provider (ASP) deployment. Several of the ASP vendors also offered enterprise, or “behind-the-firewall” deployment.

Vendor Characteristics

The software companies interviewed during the software evaluation varied in number of employees, annual revenues and the size of the installed user base. They also varied in their business model and the length of time in business. Some of the candidate vendor companies were employee-owned, and some were funded by venture capital.

Of the four vendors invited to provide software demos, two were well-established companies with histories dating back 20 years or more, and two were more recent entrants to the EH&S software market. Of these four vendors, two offered primarily “hosted” Application Service Provider (ASP) licensing (inside-the-firewall installation optional), and two offered primarily “enterprise” inside-the-firewall installations.

Deployment Issues

Time to deployment

Each of the two final candidates expected to be able to deploy basic functionality within 3-6 months, with additional features and integration to follow. This is significantly shorter than implementations of two to three years ago. Then again, the compressed timeframe underscores the need for adequate planning, attention to detail and addressing issues as they arise, to achieve a successful implementation.

System configuration and customization

Gaps occurred between the Company’s needs and the available software features, typically regarding data input forms and data output (queries, views, reports). The Company’s position was to take advantage of configuration, avoiding customization where possible. *Configuration* refers to the use of software settings to meet needs while *customization* refers to changes to the software interface and/or the underlying code.

Today's multimedia, integrated EH&S software packages are much easier to configure than the systems of the past and often offer tools to aid in deployment and ongoing maintenance. A subject matter expert can configure the system and develop data queries and reports with minimal training, where in the past this typically required a programmer. Using configuration or design tools supplied with the software, rather than by modifying the core software code. This reduces or eliminates the need for maintenance on customer-modified features when the vendor releases a new version of the software.

Integration and interfaces

The Company wished to leverage data that resides in its HR data warehouse and its work management (maintenance) systems. The Company also wished to integrate the EMIS with Lotus Notes e-mail and calendar functions. Both final candidate vendors had experience in systems integration. However, the Company needed to further evaluate whether it was necessary to fully integrate with the Lotus Notes calendar functions, or if the user could be directed to the calendar features within the commercial EMIS software.

Data Migration and Data Discovery

Data migration refers to the movement of data stored in existing systems, while *data discovery* refers to the "manual" collection of data from different sources into templates for population into the new software application. Data migration today can occur more quickly than in the past with data migration tools and templates and the "open connectivity" standards.

Despite technological advances, one of the most critical and most time-consuming efforts during deployment is data discovery, and the data cleaning required to achieve consistent data entry. The data cleaning, together with development of data naming conventions, will add significant quality to the data and the value of the decisions made using the data.

Testing, User Acceptance and Training

Testing and user acceptance are essential before the software cutover to a "live" status. Testing and user acceptance use the requirements established in the Business Requirements Document, carried forward into a Systems Requirements Specification, to determine if features and functionality were implemented as designed.

Commercial software is more likely to have training curricula and training materials in available than a custom-built, in-house solution. In the past, training often was limited to instructor-led classroom sessions or computer-based training modules. Today collaboration tools allow training with a live instructor over the Internet. Regardless of the training delivery method, the Company can select "train the trainer," end-user training and administrator/designer training. Some software vendors include a specified number of training sessions with the license fee.

User Access and Security

The Company desired the ability for users to access different features and data related to

their job role and assigned areas of responsibility. The company also desired up to twelve business hierarchy levels to allow for roll-up reporting. Findings in this area included:

- » All of the candidate software has the capability to define and apply role-based user security settings.
- » All candidate software allowed the System administrator to grant user privileges to access one or more facilities according to his/her areas of responsibility.
- » Some software packages limited the organizational hierarchy to four levels while others can adapt to organizations with five or more levels.
- » Single sign-on was not available as a standard feature in any of the applications, though one vendor had the capability to achieve this level of security through integration.

Deployment approach, methodology, resources and schedule

These factors could greatly impact the overall deployment cost. While each of the vendors proposed different approaches to deploying the system, each employed a proven methodology to minimize implementation risks, and thus overall cost. The two final vendor candidates each took responsibility for the success of the deployment by involving members of their staff on the deployment team.

Total Cost of Ownership

The total cost of ownership of a commercial EMIS includes license and support fees, as well as deployment and other costs such as ongoing maintenance and support.

License and Support Fees

The commercial EH&S software vendors used three different pricing models, shown in Table 2. License and support fees for these vendors had a wide range, shown in Table 3. Keep in mind that license and support fees are but a part of the total cost.

Table 2. Software Pricing Models and Advantages

Pricing Model	Description	Advantages
Enterprise License	<ul style="list-style-type: none"> » One-time license fee in Year 1. » Annual support fee starting in Year 2. » Annual fee typically 20-25% of one-time license fee. 	<ul style="list-style-type: none"> » Company can capitalize one-time license fees. » Company can add new modules or features as needed, keeping initial fees lower.
Application Service Provider (ASP) License	<ul style="list-style-type: none"> » Monthly subscription fee. » Based on number of users, data volume and /or other 	<ul style="list-style-type: none"> » Company can expense subscription fees. » Company can add new

Pricing Model	Description	Advantages
License Free with Consulting Services	<p>factors.</p> <ul style="list-style-type: none"> » Client purchases fee-based consulting services at specified level. » Software license provided at no charge. 	<p>modules or features as needed, keeping initial fees lower.</p> <ul style="list-style-type: none"> » Company can expense consulting services.

Table 3. Software License and Support Fees

Description	Price Range*	No. of Vendors**
Relatively Low Cost	<\$100,000	3
Moderate Cost	\$100,000 to \$200,000	6
Relatively High Cost	>\$200,000 to >\$400,000	6

* Order-of-Magnitude estimates based on 150 users, five job roles, >100 locations, specific modules.

** Nine vendors, some in two price ranges due to different enterprise and ASP pricing.

Deployment Costs

Deployment costs include, but are not limited to, deployment time and materials expenses; configuration and customization expense (i.e., custom input forms, views, reports); hardware expense (i.e., servers); software expense (desktop software, if needed to supplement the commercial application); and charges for IT services and other internal resource costs.

The two final candidate vendors were able to provide order-of magnitude costs based on 150 users limited to five (5) job roles identified in the Business Requirements Document estimate the deployment, configuration and customization costs based on similar implementations. The portion of the deployment cost that involved the vendor was 1- to 1.5 times the first year software license fees. However, these costs could vary widely and could be refined to a better, budgetary estimate only after a detailed gap analysis and software design/configuration specification is prepared.

The Company’s various IT groups provided order-of-magnitude estimates of hardware, software and internal charges. These could be refined only after selecting the commercial software and developing the detailed system design and configuration specifications.

TIPS FOR SELECTING COMMERCIAL EH&S SOFTWARE

These tips apply whether you wish to undergo a rigorous software selection and evaluation process with multiple, or if you already have an idea of the commercial software package that best suits your organization.

One: Know your needs—and keep focused!

If you think you know your needs, then verify them before selecting a commercial software system. This helps to set the project boundaries and avoid an unmanageable mess. You can always consider the commercial software's ability to meet near-term and future needs, even if not included in the current effort.

Two: Establish evaluation criteria—and follow them!

Understand what are the most critical factors, and weight them accordingly. Know if there are potential deal-killers that can eliminate one or more of the candidate software packages. Also know the flexibility your organization has regarding IT standards. Often, IT issues and concerns can be resolved by discussions between the vendor's IT specialist and your organization's IT staff, or by discussions with the Chief Information Officer at one of the vendor's reference client installations.

Three: Be familiar with the vendor and its capabilities

Since you are buying a license for a dynamic system, not a "shrink-wrapped" software package, you need to establish a good working relationship to carry your organization through the entire Systems Life Cycle (Figure 1). You will need assistance, and, perhaps, vendor resources, to deploy the system. Understand if the vendor's core capabilities are software development, consulting services or a combination of the two. Know who implements the software—vendor staff, a third party or a combination of the two.

You should expect periodic system upgrades and ongoing support from the vendor as part of the license agreement. The quality of the vendor's help desk and their responsiveness are critical to the success of your installation.

Does the vendor have other users in your industry, or users with similar needs? Can you join a user group and share best practices with other software users? Finally, remember to verify vendor references.

Four: Get the right people involved

In answering "The State of the CIO 2003" survey, 69 percent of best practices Chief Information Officers (CIOs) said user representatives from affected departments or functions should be involved in all stages of IT initiatives. Many CIOs know that getting line users involved early can increase a project's chances of success. But figuring out who to invite to the party and how to get them involved can be the real challenge...³

Involve stakeholders early and keep them involved and/or informed throughout the software selection process. Seek input from EH&S subject matter experts, IT experts and representatives from the business units that will use the system. Consider the need for input from purchasing and legal staff as well. If you do not have the required expertise in-house, seek assistance from a professional!

Five: Evaluate the Total Cost of Ownership

Many organizations select a software solution based solely upon the quoted license and support fees. This is a common mistake! License and support fees are just a portion of the total cost of the system over its lifetime. Consider the cost to deploy the system, the cost to train end-users and system administrators to use the application, hardware costs, software upgrade and customization costs, internal help desk operations, the cost of periodic system audits to ensure the system continues to serve its intended purpose, and, ultimately, the cost to retire the system.

CONCLUSIONS

Selecting a commercial EH&S Management Information System (EMIS) can be a formal or informal process. In this case study the client organization is constantly under public scrutiny and they desired a more formal selection process. Whichever route you choose, you should be able to defend your decision (and know that it was a good one) if you set the system boundaries by understanding your needs, establish evaluation criteria and use an objective evaluation process.

Also, addressing “people” issues by getting the right people involved and establishing a relationship with the software vendor can help to minimize business risk. Finally, using the Total Cost of Ownership as a barometer, but not the only evaluation criterion, can help your organization make a better decision.

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KEY WORDS

Commercial Off-the-Shelf System, COTS, EH&S Management Information System, Environmental Management Information System, EMIS, Environmental Information Management System, EIMS, Information Management System, Methodology, Software, Software Selection