

Implementing an EHS Management Information System

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Information technology issues are just as important as business and environmental, health and safety considerations. Follow these ten tips to deploy an effective EMIS with a positive return on investment.

BUSINESSES OFTEN SEEK TO STREAMLINE their environment, health and safety (EHS) operations via information solutions, such as implementing or upgrading an EHS management information system, or EMIS. By addressing information technology (IT, or “technical” for simplicity) issues along with EHS and business issues, organizations can reduce the risk of a failed software implementation. This article explores the IT issues surrounding EMIS, examines why EMIS software may remain unused even after significant investment, and offers advice for implementing an EMIS (or any other information solution).

EMIS technical issues (1)

Technical, or IT, issues can be just as compelling as financial and other business issues in motivating companies to move from paper-based or simple electronic systems to a more-wide-ranging information solution. Some of the common technical concerns are:

- Legacy systems (*i.e.*, existing computer systems or applications in which an organization has invested considerable time and money) “break,” and fixing them costs more than replacing them. Typically, these are database applications running on mainframes or minicomputers, but could include client/server- or PC-based applications developed before current Web-based applications.

- The organization lacks the expertise to support older hardware and software, and the vendor may no longer be in business.
- Legacy systems’ hardware and software have not kept pace with technology and no longer support business needs.
- Older systems are often too slow and too cumbersome — users rebel and continue to use isolated “point” solutions.
- People are isolated from the data — they can’t get to the data they need at the right level of detail at the right time.
- Automated systems (both EMIS and stand-alone solutions) sometimes are not user-friendly and encourage users to stick with isolated or manual systems.
- The company adopts new IT standards and mandates that all business areas come into compliance.
- Stakeholders need data “on demand” and existing systems cannot support these needs.

Once the IT concerns are identified, the organization can determine how an EMIS solution might address these issues and choose a system that assimilates into the company’s existing IT framework. A successful EMIS implementation can leverage technology to create tangible business process and compliance improvements, while retaining flexibility for future business needs.

Software or “shelfware?”

We all know of software systems that are “shelfware” — *i.e.*, software that remains unused and on the shelf. Why do EMIS remain on the shelf, after companies have invested so much time and effort into configuring and populating the system?

There is a large “people” component to why software remains unused. For example, imagine a scenario where software is very relevant to the business, aligned with the strategy and tactics, but the user has not been convinced that it’s useful. It is human nature to resist change, particularly when it comes to new technology and software. In addition, software may sit unused because it has not been thoroughly tested in the end-user environment, and the end-users have not received adequate training. So the user sees the software as an inconvenience, rather than a tool.

Other technical danger signs are summarized in the sidebar at the right.

Ease-of-use limitations can make or break a system. Though people-related, ease-of-use issues can be the result of the software’s technical platform and the design tools used to create the application. If the software is difficult to navigate — *e.g.*, if it requires too many “clicks” or screens to reach the desired data or report — users will resist learning the system.

Application flexibility is another prime concern. The system should be easy for a properly trained IT or EHS specialist to configure — adding users and passwords, setting up facility and regulatory hierarchy, etc. The software should have the flexibility to allow for customization, such as the addition of organization-specific terminology or custom data input forms or reports.

The fit of the proposed system within the organization’s IT standards is also critical. Common problems include: software that does not meet the organization’s database standards (*e.g.*, Microsoft SQLServer, Oracle, IBM Lotus DB2); situations where company standards do not permit software add-ins for users (*e.g.*, Adobe Acrobat Reader, Microsoft Access, Crystal Reports, Cognos Impromptu, Java Applets); and firewall and security standards that do not permit Application Service Provider (ASP) application use.

Most of these issues can be easily addressed or mitigated. Ignoring them can lead to a failed implementation. Understanding and addressing them early can help avoid later problems, making the software more useable and less likely to become shelfware.

Here are ten technical tips for a successful EMIS deployment (1).

1 Assess needs and align with IT standards

When considering an EMIS deployment, make sure to involve the IT (or information systems [IS] or management information systems [MIS] staff) early in the conceptual stages of the project. If you feel like jumping in and de-

signing the system, STOP! First, understand the organization’s IT standards and framework, then assess what type of IT infrastructure is needed for the EMIS. Then you can align your needs with the standards.

If you think you already know the IT requirements, you may be tempted to shortcut the assessment process. At a minimum, *verify* these needs with both the EHS staff and the IT staff. For example, before deploying a web-based

Technical Danger Signs

The following technical limitations can render an EMIS shelfware.

- *Ease of use:* The software is not intuitive and is difficult to navigate. The system crashes or locks up frequently.
- *Speed and bandwidth:* The network connection is too slow to make the software useful. The Internet connection does not have adequate bandwidth to support the typical number of concurrent users. Reports take too long to generate. The database is not designed to handle large volumes of data.
- *Flexibility:* The system is difficult to configure. The software is difficult to customize to meet user needs or requires a programmer or database administrator to customize it. The software comes with a preconceived business process that differs too much from what the user and/or regulatory authority expects.
- *Scalability:* The software is too large (designed only for enterprise-wide use) or too small (not designed to share some data across the enterprise) to meet current and future needs.
- *Data storage:* The server lacks adequate space to store an ever-enlarging database. Server storage space is not allocated with future needs in mind.
- *Company IT standards:* Users do not have Internet access. The organization lacks adequate client (user) hardware. The software does not meet the organization’s database standards. Company standards do not permit software add-ins for users. Firewall and security issues prevent the use of Application Service Provider (ASP) applications.
- *Ease of deployment:* The proposed deployment requires 12–18 months and a large team of IT hardware and software specialists. The EMIS lacks reusable components to ease deployment. Initial data population using bulk loading is difficult.
- *Maintenance and upgrades:* The system is difficult to maintain. The vendor does not provide easily applied software patches.
- *Support:* The software is difficult to support internally. The application requires a large, specialized support staff. The software vendor does not provide adequate support.

application, ensure that you have the correct hardware and software. Make sure that the application you are considering meets or exceeds security standards. If the system under consideration requires dedicated servers, obtain specifications from your technical staff and work within these specifications. If you anticipate the need for decision-support software to analyze data “on the fly,” learn what your organization uses. Finally, remember that while IT standards may appear to be rigid, they are in place for good reasons and may allow a bit of flexibility.

2 Integrate with the existing IT architecture and environment

EMIS should be part of the everyday landscape, just as other business information systems. Wherever possible, select hardware and software options that integrate well with the existing IT architecture and environment. If the organization uses hard-wired networks, don't try to employ a wireless network unless your IT staff is willing to support it. If the company has a single server for both the application and the web components, don't feel compelled to specify separate servers. If your EMIS has field data-entry capabilities that use handheld devices, don't force-fit a Palm OS device into a Pocket PC environment, or vice versa. Use ruggedized or intrinsically safe devices where required and don't try to stretch the rules to use the latest gadgets.

3 Understand leading edge vs. bleeding edge

Technology continues to change. What was considered the standard a year, or even six months, ago may be considered useable but obsolete. But there is a great divide between “tried and true” and “techie” from a business standpoint (see figure).

Some organizations are culturally more “techie” and prefer to work on the “bleeding edge” of the technology adoption curve, working with disruptive technologies. They understand the competitive edge that a bleeding edge tech-

nology can offer, and are willing to put up with being one of the first to try the new EMIS and/or technology. These early adopters typically will not provide the best references, as they will recount the lengths they went to in deploying the system — working with system bugs, incomplete features and functionality, etc.

Good advice for most organizations considering an EMIS is to employ “leading edge” technology that has been tested, and obtain references from other firms that have employed the EMIS and/or the technology. These references, as well as your own IT staff, will be valuable in helping you decide whether to use the new technology. If you adopt a leading edge system, you can gain a degree of competitive advantage without severely disrupting your day-to-day business.

Other organizations are more conservative with regard to IT innovation and will wait for hardware and software to be proven before they will employ it. These late adopters will not gain the competitive edge of the early adopters, or even the early market majority. However, they will have the advantage of commodity-like pricing and a well-tested product.

4 Leverage! Leverage! Leverage!

Examine the array of available software and hardware to support your business needs. Leverage these systems to the extent possible to reduce ongoing operations and maintenance costs. For example, if your materials handling system stores chemical property data or material safety data sheets (MSDS), you may not need to implement a separate system for these functions, and providing a link may suffice. Conversely, do not try to force-fit your EHS system's integration with other systems if doing so will be unduly cumbersome.

5 Try before you buy

Demonstrations are a good way to gain a rapid understanding of an EMIS' features and functionality, look and feel, and ease of use. However, simply seeing demonstrations typically will not give you the depth of understanding needed to make a business decision.

Consider a pilot test using data representative of your industry and your organization to see how the system can be applied in your business. Have clear goals, objectives and expectations before conducting the pilot so you will gain valuable information. Pilot tests can help you to identify potential technical danger signs, software and hardware gaps, and other issues that you can address as part of the overall solution.

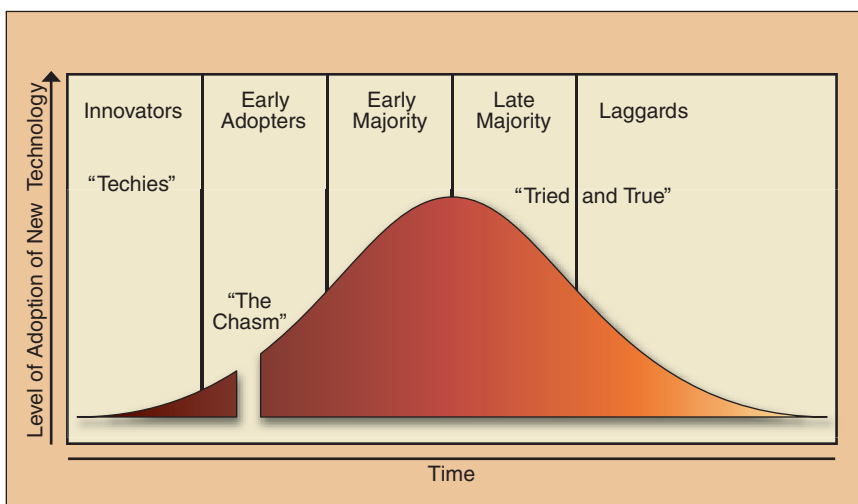


Figure. The technology adoption process.

6 Seek technical assistance early and often

Your IT staff are key stakeholders in the systems project and are an important part of your team. Your technical staff should be valued advisors, willing to help you make good decisions and save you time and money.

As mentioned earlier, it is important to get your technical staff involved early in any EMIS undertaking. It is critical to consult with these experts to avoid costly mistakes with hardware and software specification and configuration. In addition, it is critical to keep your technical staff involved as team members throughout the system lifecycle — concept, configuration and design, development, data population, training, deployment, and ongoing operation, maintenance and support.

7 Provide sufficient subject matter and IT training

People do not automatically adjust to new systems; doing so requires training and experience. It takes a while before the organization achieves the maximum benefits. An EMIS, like other systems, often requires users to adapt their business processes. Many organizations short-change themselves by providing little or no training, and then training only system end-users. Provide adequate subject matter and IT training for management, operations, IT staff and end-users so all stakeholders can use the system to its fullest.

For example, the IT staff may need to better understand the “business rules” for determining air emissions estimates to properly configure the software and annual emissions reports. The operations staff may need to better understand the “business rules” to understand the importance of the data they collect and accurate data entry. The end-users may need to better understand certain IT and operations issues to appreciate how the software generates the annual emissions report. Finally, management may need training to understand how to use decision-support tools that display EHS business metrics.

There are many technology tools available today to assist in training development, delivery and management, from simple slide presentations to self-paced computer-based training to webcasts (2). Take advantage of them.

While it is difficult to gauge the amount of time required for training, adequate time must be allotted so the users are familiar with how to perform their day-to-day tasks using the system. This may require more than one session, as well as ongoing support once the system goes “live.”

8 Build in flexibility

Incorporate flexibility to allow for future hardware and software upgrades, as well as growth in data volume and the number of facilities and users. If you feel that the EMIS will expand to additional environmental media or

will be used by additional facilities in the future, begin with this vision in mind.

Build flexibility into the data system architecture by sizing and configuring the system to allow for future addition of storage space and user connectivity. Design in enough bandwidth so the software can work with the projected number of concurrent users, while allowing for future growth.

Each EMIS has within its framework a certain degree of flexibility that allows the application to be configured. For example, some types of data, such as emissions equations, validation data and product line names, are likely to be shared among facilities. Other data are facility-specific. By building the proper data framework, you can share data and get more-consistent data entry across multiple sites.

9 Develop an exit/transition strategy

Understand that hardware and software have a shelf life, typically three to five years. Audit your EMIS periodically to see if it meets its intended purpose and make adjustments or upgrades as needed. When your system appears to have more add-ons than “original equipment” it likely is well past the time when you should have considered a new system. Develop an exit strategy to abandon the system and/or a transition strategy to move to a new solution.

Many companies mistakenly believe that if a system is deployed according to plan, then it should work. Most firms do not spend adequate time planning, developing evaluation criteria and success metrics, or performing a quality check to see if what was designed was actually implemented. Organizations that are committed to continuous improvement conduct post-implementation audits to thoroughly evaluate the benefits of the software solution. After spending thousands, or sometimes millions, of dollars on IT, you should make sure that these resources were well-spent, that the system meets your needs and that it adds value to the organization. In addition, software maintenance is part of a commitment to continuous improvement. A good project plan anticipates the need for procedures to evaluate, control and make modifications once the system is deployed (3). When audits indicate that the system does not meet needs or add value, or maintenance begins to consume significant resources, it may be time to move on.

10 Employ IT best practices

Best practices help a business reduce IT costs. According to Compaq Corp. (now HP), best practices are the proper deployment of technology integrated with process and management practices that deliver maximum usable functionality at minimum cost.


IT best practices encompass three areas:

- technology improvement — automated software distribution, and electronic software and hardware inventory
- process improvement — standardization of operating system platforms for servers, client computers and peripherals, and software application standardization across the organization

- people skills improvement — end-user and IS training.

Not surprisingly, the people-related best practices often can result in the most dramatic cost savings. Some IT best practices are more objective and measurable, while others are more subjective, and thus more difficult to measure.

Best practices help to ensure consistency across the organization and ultimately reduce ongoing operation and maintenance expenses, which can be much greater than the initial capital expenditure for the software and its deployment.

By factoring in IT issues from project concept through deployment, and ongoing operation and maintenance, an organization will be better positioned to get positive returns from its systems. 

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