



Technical Tips for Implementing an EHS Management Information System

By

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ABSTRACT

When businesses seek to streamline their environment, health and safety (EHS) operations, they often seek information solutions. Organizations today expect to receive rapid return on their investments, including EHS management information systems, or EMIS. Addressing Information Systems/Information Technology/Management Information Systems (IS/IT/MIS)¹ issues in tandem with EHS and business issues can help organizations reduce the risk of a failed software implementation. This paper explores the technical issues surrounding EMIS, examines why EMIS software may remain unused even after significant investment, and offers technical tips for implementing an EMIS, or any other information solution, to result in positive returns.

The technical motivations for moving from paper-based or simple electronic systems to a more wide-ranging solution range from problems with legacy systems to corporate IT standards to user-friendliness of existing applications. The reasons why software often becomes “shelfware” are addressed in terms of the Five Deadly Sins of Unused Software and Technical Danger Signs that can indicate a less than successful deployment lies ahead. The ten technical tips for implementing an EMIS are presented to help organizations avoid pitfalls from the earliest conceptual stages of the project through ongoing operation and maintenance.

Organizations often focus on business matters when considering an EMIS or other management information systems, overlooking important technical matters. If organizations factor in technical issues from project concept through deployment and ongoing operation and maintenance, they will be better positioned to get positive returns from their systems.

INTRODUCTION

When businesses seek to streamline their environment, health and safety (EHS) operations, they often seek information solutions. Organizations today expect to receive rapid return on their investments, including EHS management information systems, or EMIS. Addressing Information Systems/Information Technology/Management Information Systems (IS/IT/MIS)² issues in tandem with EHS and business issues can help organizations reduce the risk of a failed software implementation.

This paper explores the technical issues surrounding EMIS, examines why EMIS software may remain unused even after significant investment, and offers technical tips for implementing an EMIS, or any other information solution, to result in positive returns.

EMIS TECHNICAL ISSUES³

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

- Legacy systems “break” and it costs more to fix than to replace them.⁴
- 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 (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 organizations identify technical concerns, they can determine how an EMIS solution might address these issues and choose a system that assimilates comfortably into the company’s IT framework. A successful EMIS implementation can leverage technology to create tangible business process and compliance improvements while retaining the flexibility for future business needs.

SOFTWARE OR “SHELFWARE?”

Once an organization has decided to adopt an automated system to manage EH&S data, the software must be used to realize value. We all know of software systems that are “shelfware⁵.” Why do EMIS remain on the shelf, after companies have invested so much time and effort into configuring and populating the system?

The Five Deadly Sins

Sari Kalin uses an analogy to the Seven Deadly Sins and the Seven Virtues⁶ to illustrate why software is not used. Table 1 below summarizes the Five Deadly Sins of Unused Software.⁷ As in any other change in an organization’s business processes, there is a large “people” component to introducing a new software system. Kalin notes,

Although it's human nature to resist change, that doesn't mean slothful employees shoulder all the blame for failing to use new software. The software's executive sponsors have clearly fallen short in selling employees on the new software. "You could have a scenario where software is very relevant to the business, aligned with the strategy and tactics, but you haven't gotten the user to believe it's useful.

Table 1. The Five Deadly Sins of Unused Software

Vice	Virtue
Ignorance	Roll out IT asset management software that offers software usage metering. Know how often the software is used.
Fear	Take stock of what you have, and set priorities for its implementation. Learn how to use the software.
Gluttony	Stay focused on strategic goals. Be realistic about your ability to implement what you buy in a reasonable time frame—before you fill up your plate.
Aggravation	Test software usability before rollout, and train people how to get the most out of it. Nielsen recommends that companies allot 10 percent of their software implementation or upgrade budget to user testing.
Sloth	Give employees a good reason to switch over to the new software. "You have to find something that makes it relevant to the employees."

Technical Danger Signs

Organizations should be aware of a number of technical issues when considering an EMIS. Table 2 captures some of the technical danger signs common to EMIS implementations.

Table 2. Technical Danger Signs

Technical Issue Area	Danger Signs
<i>Ease of Use</i>	<ul style="list-style-type: none"> ▪ Software difficult to navigate ▪ Software not intuitive ▪ Frequent system “crashes” or “lock ups”
<i>Speed and Bandwidth</i>	<ul style="list-style-type: none"> ▪ Network connection too slow to make software useful ▪ Internet connection does not have adequate bandwidth to support typical number of concurrent users ▪ Reports take too long to generate ▪ Database not designed to handle large volumes of data
<i>Flexibility</i>	<ul style="list-style-type: none"> ▪ System difficult to configure ▪ Software difficult to customize to user needs or requires programmer or database administrator to customize ▪ Software comes with preconceived business process that differs too much from what the user and/or regulatory authority expects
<i>Scalability</i>	<ul style="list-style-type: none"> ▪ 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
<i>Data Storage</i>	<ul style="list-style-type: none"> ▪ Server lacks adequate space to store ever-increasing database size ▪ Server storage space not allocated with future needs in mind
<i>Company IT Standards⁸</i>	<ul style="list-style-type: none"> ▪ Users do not have Internet access. ▪ Organization lacks adequate the client (user) hardware ▪ Software does not meet Organization’s database standards ▪ Company standards do not permit software add-ins for users ▪ Firewall and security issues prevent ASP use
<i>Ease of Deployment</i>	<ul style="list-style-type: none"> ▪ Proposed deployment requires 12-18 months and a large team of IT hardware and software specialists ▪ EMIS lacks reusable components to ease deployment ▪ Initial data population using bulk loading is difficult
<i>Maintenance and Upgrades</i>	<ul style="list-style-type: none"> ▪ System difficult to maintain ▪ Vendor does not provide easily applied software “patches”
<i>Support</i>	<ul style="list-style-type: none"> ▪ Software difficult to support internally ▪ Application requires a large, specialized support staff ▪ Software vendor does not provide adequate support

Ease of use issues 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 – 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, for example, adding users and passwords, setting up facility and regulatory hierarchy, etc. The software should have the flexibility to allow for customization, for example, the addition of organization-specific terminology, 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 the issues can lead to a failed implementation. Understanding and addressing these issues early can help avoid later problems, making the software more useable and less likely to become Shelfware.

TECHNICAL TIPS FOR IMPLEMENTING AN EMIS⁹

Various software vendors, business process reengineering experts and software implementation specialists offer a host of business- and organization-related tips for implementing an environment, health & safety management information system. These often focus on getting involvement of key stakeholders early and keeping them involved throughout the project life cycle, as well as aligning the new system(s) with the organization’s philosophy, culture and business processes. This section of the paper offers ten technical tips (Table 3):

Table 3. Ten Technical Tips for Implementing an EMIS

<i>Ten Technical Tips</i>	
1	Assess needs and align with the organization’s IT standards.
2	Integrate with the existing IT architecture and cultural environment.
3	Employ “leading edge” versus “bleeding edge” technology to streamline business processes without compromising performance.
4	Leverage existing systems when possible.
5	Try before you buy – consider demos, pilots, etc.
6	Seek technical assistance early and often.
7	Provide sufficient technical and subject matter training.
8	Build in flexibility to address future needs and database growth.
9	Develop an exit/transition strategy.
10	Employ IT Best Practices.

1 Assess Needs and Align with IT Standards

When considering an EMIS deployment, make sure to involve your IT, IS or MIS staff early in the conceptual stages of the project. If you feel like jumping in and designing the system, *STOP!* First, understand your organization's IT standards and framework, then assess what type of IT infrastructure you will need for the EMIS. Next, you can align your needs with the standards.

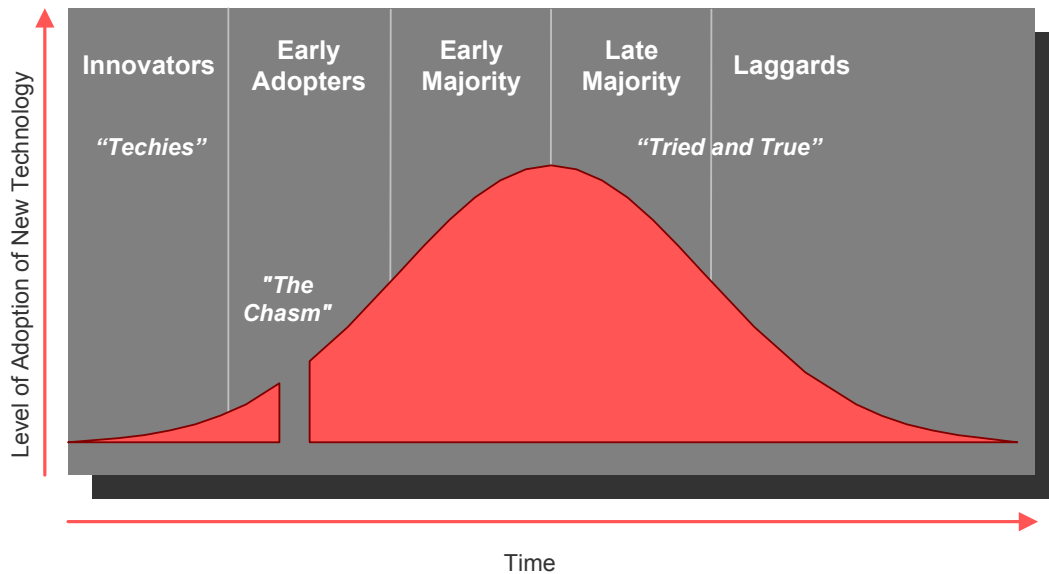
If you think you already know the IT requirements you may be tempted to shortcut the assessment process. At minimum, *verify* these needs with both the EHS staff and the IT staff. For example, if before deploying a web-based application, ensure you have the correct hardware and software. Make sure that the application you are considering meets or exceed security standards. If the system under consideration needs 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

EHS management information systems 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 your organization uses hard-wired networks, don't try to employ a wireless network unless your IT staff is willing to support it. If your organization uses a single server for both the application and the web components, don't feel compelled to specify separate application and web servers. If your EMIS has field data entry capabilities that use handheld devices, don't force-fit a Palm OS device into a Pocket PC¹⁰ 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 Leading Edge versus Bleeding Edge

Technology continues to change; what was considered the standard a year, or even six months ago, may be considered usable but obsolete. But there is a great divide between "tried and true" and "techie" from a business standpoint. See Figure 1, Technology Adoption Process.¹¹

Figure 1. Technology Adoption Process

Some organizations are culturally more “techie” and prefer to work on the “bleeding edge” of the Technology Adoption Curve, working with disruptive technologies. These organizations understand the competitive edge that a bleeding edge technology 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. – all the time knowing what they were getting into when they signed up!

Good advice for most organizations considering an EMIS is to employ “leading edge” technology that has been tested, and obtain references within other organizations 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. If it does, you may not need to implement

a separate system for these EH&S functions, just provide a link. Conversely, do not try to force fit your EH&S with other systems where using, integrating with or interfacing with the other systems will be too cumbersome.

5 Try Before You Buy

Demos are a good way to gain a rapid understanding of an EMIS' features and functionality, look and feel, and ease of use. However, seeing demonstrations alone typically will not give you the depth of understanding needed to make a business decision. Consider a pilot with data representative of your industry and your organization to see how the system can be applied in your organization. Use the pilot as proof of concept for your organization rather than using the pilot as an in-depth demonstration. Have clear goals, objectives and expectations before conducting the pilot so you will gain valuable information. Pilots can help you to identify the Technical Danger Signs (above), software and hardware gaps, as well as other issues that you can address as part of the overall solution.

6 Seek Technical Assistance Early and Often

Your IT staff are key stakeholders in your 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. Not only is it critical to understand the IT framework within which you will be operating, but also 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 a team member throughout the system life cycle – concept, configuration and design, development, data population, training, deployment, and ongoing operation, maintenance and support.

7 Provide Sufficient Subject Matter and Technical Training

People do not automatically adjust to new systems; it 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, only to system end-users. Provide adequate subject matter and technical 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 calculating and rolling up 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 the importance of 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 web casts.¹² Take advantage of them!

8 Build in Flexibility

Build in flexibility to allow for future hardware and software needs, as well as growth in data volume, 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 organizations to configure the application. For example, some types of data such as emissions equations, validation data (equipment types; state, province and country names; etc.) and business 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 no more than 3-5 years. Review your EMIS periodically 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.

10 Employ IT Best Practices

Best Practices help organizations reduce their IT costs. According to Compaq Corporation (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 involve technology improvement, process improvement and people skills improvement.¹³ 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.

CONCLUSIONS

Organizations often focus on business matters when considering an EMIS or other management information systems, overlooking important technical matters. If organizations factor in technical issues from project concept through deployment and ongoing operation and maintenance, they will be better positioned to get positive returns from their systems.

REFERENCES

1. Hereafter referred to using the terms “IT” or “technical” for simplification.
2. Hereafter referred to using the terms “IT” or “technical” for simplification.
3. Gilbert, Jill Barson, IT Insight, “Business and Technical Motivations for Implementing an EMIS,” *EM*, June 2002.
4. Legacy systems are computer systems or applications in which an organization has invested considerable time and money and are viewed as difficult to modify. 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.
5. Software that remains unused, often sitting on the shelf.
6. Pope Gregory (d. 604) identified the Seven Deadly Sins: Pride – Envy – Gluttony – Lust – Anger – Greed – Sloth and the Seven Virtues: Humility – Love – Faith and Temperance – Self Control – Kindness – Generosity – Zeal.
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8. Software names are trademarks or registered trademarks of the respective companies and are shown here only as illustrations, not as product endorsements.
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KEY WORDS

Best Practices
Database
Environmental
Environmental Management
Environmental Management Information System

EMIS
Implementation
Information Solutions
Information Systems
Information Technology
Information Management
IS
IT
IT Best Practices
Management Information System
MIS
Risk Reduction
Strategy
Systems Implementation
Technology Adoption Curve