



WHITE PAPER

The Case for Software-Driven Environmental Management Systems

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Why is EPA Committed to Environmental Management Systems?

What is an Environmental Management System?

Why are Information Systems Important in an Environmental Management System?

Why is Regulatory Tracking a Critical Component of EMIS?

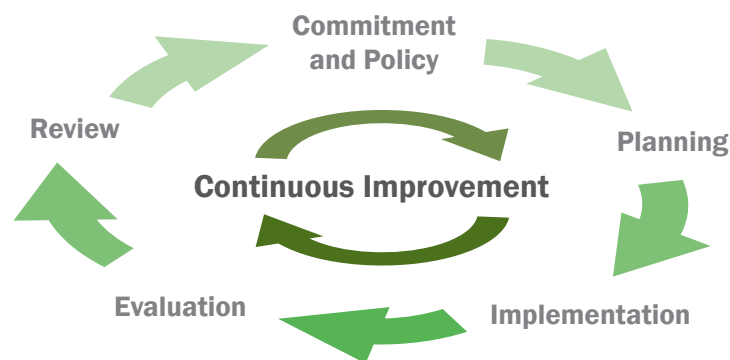
Conclusion

“Defendant shall ... develop a compliance-based Environmental Management System.” [1]

With words like these, the Environmental Protection Agency (EPA) frequently mandates that organizations implement an Environmental Management System (EMS) to promote regulatory compliance and curb future environmental impact. This White Paper explores EPA's commitment to EMS's, describes the essential elements of an EMS, and explores the importance of computerized information systems in implementing and maintaining an EMS. →

Why is EPA committed to Environmental Management Systems?

The late, great Taiichi Ohno, father of the Toyota Production System (from which the lean manufacturing method derives), stated that “[i]mproving efficiency makes sense only when it is tied to cost reduction” [2]. While organizational benefits are not a primary concern for EPA, the agency recognizes that its own interests are best served when overtly integrated with organizational interests [3]. To this end, **EPA contends that identifying and eliminating the causes of environmental problems help the organization to achieve its own economic objectives [4].**



Specifically, EPA defines an EMS as a framework that helps an organization continually achieve its environmental goals through consistent review, evaluation, and improvement of environmental performance, offering the following benefits [5]:

- Improved environmental performance
- Enhanced compliance
- Pollution prevention
- Resource conservation
- New customers/markets
- Increased efficiency/reduced costs
- Enhanced employee morale
- Enhanced image with public, regulators, lenders, investors
- Employee awareness of environmental issues and responsibilities

Simply put, EPA believes that an EMS makes good business sense.

What is an Environmental Management System?



The fundamental principle underlying all management systems is that understanding how the system's processes interact with each other to produce results **enables the organization to both optimize and improve system performance** [6]. An Environmental Management System is merely that part of the management system used to manage environmental aspects, fulfill environmental compliance obligations, and address environmental risks and opportunities [7].

The internationally dominant ISO 14001 standard remains the leading model for EMS requirements. Substantially revised in 2015, ISO 14001 outlines the following requirements for an EMS:

- **Context of the Organization** (Scope of the EMS, General requirements)
- **Leadership** (Environmental Policy, Roles/Responsibilities/Authorities)
- **Planning** (Environmental Aspects & Impacts, Compliance obligations, Risks, Objectives & Targets)
- **Support** (Resources, Training, Document control, Record management)
- **Operation** (Controlling environmentally significant processes, Change management, Emergency planning & response)
- **Performance Evaluation** (Monitoring environmental performance, Internal audits, Compliance reviews, Management review)
- **Improvement** (Corrective & preventive action)

An EMS is used to... fulfill environmental compliance obligations and address environmental risks and opportunities.

While many environmental regulations delineate complex and detailed compliance requirements, **ISO 14001 provides an aspirational framework intended to balance environmental protection with socio-economic needs** [8]. For example, ISO 14001 mandates that an organization must systematically evaluate how well it is fulfilling its compliance obligations, but offers only superficial suggestions (through a companion guidance document) regarding how the organization might actually accomplish this evaluation, e.g., by gathering information and data through facility inspections and reviewing legally required documents and records [9].

...no EMS in and of itself can guarantee that an organization will achieve its environmental goals...

Of course, no EMS in and of itself can guarantee that an organization will achieve its environmental goals, especially absolute compliance with all applicable requirements [10]. While some might suggest that underperformance invalidates the underlying principles of an EMS, proponents of managements systems, including the EPA, would contend that underperformance is more appropriately a symptom of a management system that is not effectively implemented [11].

Why are Information Systems Important in an Environmental Management System?

For relatively straightforward organizations with low environmental complexity and impact, simple tools like spreadsheets may suffice to effectively monitor and manage environmental compliance, objectives, and risks. However, larger and more environmentally complex organizations need more sophisticated tools, which, in today's world, typically means integrated databases and software [12].



The right mix of software tools are vital to an effective EMS in many ways including:

- Providing **timely updates regarding regulatory changes** which may affect the organization. Such insight allows decision makers to identify potential gaps and begin implementing appropriate countermeasures well ahead of compliance deadlines, particularly important if substantial capital investment is required.
- Providing mechanisms for **monitoring the real-time status of corrective and preventative actions** and other key EHS-related performance indicators.
- Providing mechanisms for **sharing EHS information across the entire organization**. Such failure contributed in part to Dupont, purveyor of a world-class behavior based safety program, finding itself on OSHA's Severe Violator Enforcement Program [13].
- Providing a **central repository for 'institutional EHS knowledge**. As droves of "Baby Boomer" EHS professionals leave the workforce, a wealth of knowledge and experience is at risk of being lost [14].
- Providing mechanisms for **prioritizing risks and allocating limited resources**. Under the modern tenets of lean manufacturing, waste – something which does not directly add value to the product or service – must be aggressively identified and eliminated.
- **Standardizing data collection, analysis, and reporting.** Consistent with lean philosophy, EHS reporting can be replete with waste, collecting and cobbling together the requisite data and information from a multitude of facility or organizational sources, crunching the numbers, and transcribing the information to EPA systems. Software eliminates such waste, from basic typographical errors to ensuring correct and consistent application of complex analytical models to electronic data exchange with EPA databases.

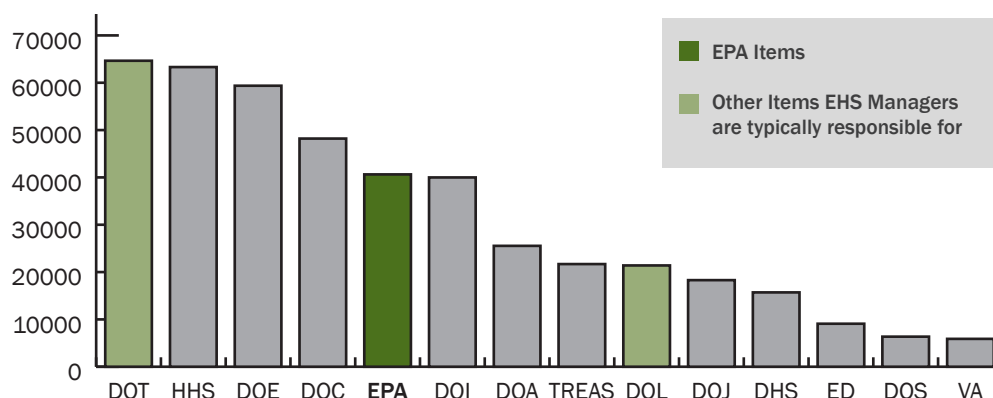
The key to effective environmental management is the use of a systematic approach to planning, controlling, measuring and improving an organization's environmental performance.

Why is Regulatory Tracking a Critical Component of Environmental Management Information Systems?

Combined, the framework of EMS and the functionality of Information System is known as an Environmental Management Information System (EMIS). An EMIS is defined as an 'organizational-technical system for systematically obtaining, processing, and making available relevant environmental information available in companies' [15]. There are no shortage of commercial EMIS available and many satisfy the core requirements of documenting activities, managing tasks, analyzing performance indicators, and exporting reports. **Where most commercial systems fall short, however, is in the area of regulatory compliance.**

According to data from the federal register, the EPA published 40,634 items from 1994 to April of 2013 [16]. Comparably, the Department of Agriculture published 25,540; the Department of Labor, 21,393; and the Department of Justice, 18,279 (see Figure 1).

Figure 1:
Items published
by agency from
1/1/1994 and
4/1/2013.



Due to the ever-changing nature of EHS-related regulatory requirements, organizations that rely on staff to manually monitor and update compliance activities in their EMIS are more likely to struggle with compliance obligations. Even when organizations employ dedicated



staff or consultants to monitor regulatory changes, the separation between software tools and regulatory tracking can lead to gaps in compliance efforts.

Dakota Software offers **a unique combination of curated regulatory content and EHS management software tools**. This integration is made possible by an in-house team of regulatory experts who continually review changing requirements and update an onboard reference library. Because this library is mapped to site-specific requirements within the software, users are notified of relevant changes and provided with guidance for maintaining and verifying compliance activities.

...the separation between software tools and regulatory tracking can lead to gaps in compliance efforts.

Conclusion

In this age of high-profile enforcement efforts and increased scrutiny from investors and consumers, effective Environmental Management Systems are more than good corporate citizenship; they're good business. **Organizations who leverage commercial software systems for monitoring and taking action on their EMS processes are better positioned to fully realize the benefits of these systems.** Furthermore, EHS software that integrates regulatory content allows organizations to proactively manage compliance and establish a strong foundation for their continuous improvement and social responsibility programs. ■



About the Author

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Dakota's Compliance Services team of EHS professionals provides tactical project management and client system configuration. Jay brings to this effort more than 20 years of diverse industry experience, including over 12 years in various Environmental, Health, and Safety capacities. Prior to joining Dakota, Jay held a variety of educational, technical, and managerial positions. Jay has degrees in mechanical engineering, business administration, operations research, and law. He also holds CHMM, CVI and LEAN Manufacturing certifications.



About Dakota Software

Dakota Software is a leading provider of compliance-based EHS and Risk Management solutions. Our ProActivity Suite combines a comprehensive regulatory library with enterprise-level software tools for mapping relevant requirements and monitoring related activities. With a combination of forward-looking analysis and snap-shot auditing, Dakota's tools help put EHS efforts in-step by providing visibility and guidance where and when it's needed.

Sources

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- (3) Stapleton, P.J., Glover, M.A., and Davis, S.P., **Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations (2nd Ed.)**, NSF International, January 2001.
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- (5) See <https://www.epa.gov/ems/learn-about-environmental-management-systems#costs>.
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- (7) ISO 14001:2015, §3.1.2
- (8) See ISO 14001:2015, §3.2.2.
- (9) See ISO 14004:2016, §9.1.2.
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- (13) "OSHA adds DuPont to severe violator list after leak," *USA Today*, July 13, 2015.
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- (15) See <http://aisel.aisnet.org/cais/vol17/iss1/34/>
- (16) Federal Register Agency List
<https://www.federalregister.gov/agencies/environmental-protection-agency>