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The environment, health, and safety (EH&S) domain is a moving target. While things may not change quite as quickly as they do in the information technology (IT) world, EH&S professionals can learn a great deal from agile software development methods that attempt to minimize business risks. This column applies agile development attributes to EH&S management information systems (EMIS).

AGILE PROCESSES

Webster's New Collegiate Dictionary defines ***agile*** as "(1) marked by ready ability to move with quick easy grace; or (2) having a quick resourceful and adaptable character." *Agile processes* initially applied only to software development, but the terminology was later extended to other business areas, including human resources management. Defined in the 1990s and refined ever since, agile processes deal with change and unpredictability and attempt to balance structure and flexibility. In short, agile processes are a series of methodologies that are

- adaptive rather than predictive, welcoming change;
- people-oriented rather than process-oriented, where the role of the process is to provide structure and support to the development team;
- iterative, with a focus on short-term deliverables and milestones; and
- complete with strong feedback mechanisms (see Highsmith, J. *What is Agile Software Development?*; Crosstalk, October 2002; available at www.stsc.hill.af.mil/crosstalk/2002/10/highsmith.html).

Among companies that successfully apply these processes, agility goes beyond the IT department and becomes ingrained in the organization's people and culture. As an example of this business trend, *CIO Magazine* each year names 100 IT leaders that successfully "marry IT agility with enterprise agility to move quickly, adapt intelligently, and create advantage in a rapidly changing world" (see Prewitt, E. The Agile 100; *CIO Magazine*, August 15, 2004; available at www.cio.com/archive/081504/overview.html).

AGILE EMIS

Due to increases in data volume and complexity, the growing visibility of EH&S issues in the boardroom and in the community, and ever-increasing regulatory requirements, many companies turn to software to automate their EH&S business processes. Agile EMIS are much more than data repositories for EH&S data, often including knowledge management, collaboration, and decision-support tools to offer competitive advantage. Agile EMIS can leverage knowledge from throughout the business to enable enterprisewide continuous improvement and enhanced decision-making. Below are 10 key characteristics of agile EMIS.

Modular

Agile systems comprise modules that work alone or in concert with others. Users can implement, or "plug in," additional modules as needed. The modules typically share a framework—a common look and feel, as well as navigation, query, and reporting tools. They may also share chemical and regulatory databases, calculation engines, electronic filing systems, and decision-support tools.

Commercial EMIS, such as Environmental Software Providers' opsEnvironmental (www.esp-net.com) and Environmental Support Solutions Inc.'s EssentialSuite (www.ess-home.com), comprise media-specific—air, water, and waste—modules, while others, like the Enviance System from Enviance Inc. (www.enviance.com) and Perillon Software Inc.'s Workspace (www.perillon.com), have modules that apply across all media and functions (e.g., compliance task management, document management, numerical data management). In either case, companies can purchase modules a la carte, selecting only those that meet their needs, rather than purchasing an entire software suite.

Iterative

Agile systems are developed through a series of iterations. This repetitive process allows rapid prototyping and feedback. Much of the feedback comes from the user community, which may span multiple industries and types of users. Each series of iterations results in improved software features, functionality, quality, and technology. Iterations also allow the rapid addition of new features, for example, when a new environmental reporting requirement such as Title V compliance certification takes effect.

Time-Bound

Agile systems exercise defined time constraints, with clear deliverables (e.g., a new data entry form, report, or other output) scheduled in short time periods of one to two weeks. Breaking down EMIS tasks into small blocks facilitates the tracking of a project's progress—each task is either "done" or "not done." At the same time, defined time constraints allow

rapid delivery of an EMIS in weeks or months, instead of years. Once implemented, these systems deliver data in real time or near time to provide the greatest value for businesses.

Economical

Agile systems are economical in design, favoring simplicity versus complexity. One EH&S software vendor, for example, intends its system to be as intuitive as using an ATM. In addition, agile systems are economical from a financial perspective, with clear benefits for the cost. Case in point: an electronic EH&S compliance task management system can reduce the cost of manual task completion and documentation, which can range to six- or seven-figure amounts annually for a complex facility. Such a system can reduce the high costs of deviation reporting by standardizing reports and common data queries and by making data available near-time. That said, agile EH&S systems are not necessarily inexpensive compared to other business software.

Adaptive

Agile systems help streamline business processes by adapting to existing processes rather than completely changing them. Agile systems provide standardized business processes across the enterprise, and a degree of structure, but can accommodate changes in the business with little disruption, allowing organizations to easily add new users, facilities, regulations, or equipment.

CHARACTERISTICS OF AGILE EMIS

1. **Modular**
2. **Iterative**
3. **Time-Bound**
4. **Economical**
5. **Adaptive**
6. **Incremental**
7. **Convergent**
8. **People-Oriented**
9. **Collaborative**
10. **Complementary**

Source: Borrowed from Miller, R. *The Dynamics of Agile Software Processes, Part I: Characteristics*; Borland Developer Network, (revised) July 15, 2003; available at http://bdn.borland.com/article/0,1410,29726,00.html.

Incremental

Agile systems are incremental in their development and implementation (see also Modular). Different components can be "packaged" to address a customer's specific needs. Agile systems can be adopted incrementally, to show early

value and minimize business risks. A company can implement a compliance calendar today, and add on detailed day-to-day air, water, and waste compliance features later, if desired.

Convergent

Agile systems use convergent technologies to bring together disparate data sources, providing the user with a seamless solution. Web services, portals, data warehousing, e-mail, data dashboards, and the like bring together a series of diverse information sources—operations data, regulatory data, public information sources, metrics and key performance indicators—in one place.

People-Oriented

Agile systems can be considered people-oriented or user-friendly and require minimal user training. They provide an interface that is easy to navigate; include business processes that are logical to the casual user, mirroring the real world; and even elevate staff productivity rather than complicating day-to-day tasks. According to software developer Randy Miller, "You'll know when your process is right when it doesn't take extraordinary people to do ordinary tasks" (Miller, R. *The Dynamics of Agile Software Processes, Part I: Characteristics*; Borland Developer Network, [revised] July 15, 2003).

Collaborative

A centralized data repository alone does not promote collaboration across an enterprise. Agile EMIS promote collaboration by

- improving business processes;
- facilitating distributed teamwork;
- distributing data entry throughout the company, which allows entry where data originate, often in operations;
- automating work flows, which brings together many parties;
- serving as a central data repository, which allows many people to share data and enhances the corporate knowledge base;
- providing more accurate, real-time, consistent information; and
- reducing or eliminating duplicate data entry.

Complementary

Finally, agile systems often contain elements that complement the EH&S subject matter modules, such as wizards, data manipulation tools, and decision-support tools.

BENEFITS OF AGILE EMIS

Agile EMIS have several benefits. They can help organizations more easily and efficiently manage EH&S risks, resulting in lower compliance costs, fewer notices of violation, and better operational performance. In addition, agile systems can help organizations adopt EH&S, operations, and business best practices.

Agile EMIS can also provide a positive return on investment. Quantifiable savings can result from direct, out-of-pocket cost savings (e.g., fewer travel days for audits when data and documents are available electronically), reduced labor to complete the annual task burden of the organization (e.g., data entered by operations employees who conduct compliance tasks), and increased productivity (e.g., through standardization, near real-time data entry, and elimination of multiple data hand-offs). "Soft" savings can result from an improved company image, stakeholder satisfaction, and increases in the sustainability "triple bottom line"—economic, social, and environmental factors—achieved by better management of EH&S risks.

EH&S business processes, when supported by agile EMIS, can provide companies with a competitive advantage. Agile EMIS will continue to evolve to fit the maturity levels of software vendors and the user community. To realize the true value of agile systems, your organization must itself be agile and able to adapt to new and improved business processes. **em**

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