The Brave New World of Learning

Workflow trumps courseware in an emergent new world where the terms and tools are changing—and you need to absorb Web services, super-stack environments, zero-latency, and a slew of acronyms. And, by the way, just-in-time is too late.

By Sam S. Adkins

Enterprise technology is in the midst of an accelerating process of integration and convergence. Learning technologies such as LMSs (learning management systems) and LCMs (learning content management systems) are being assimilated into integrated enterprise application suites. Real-time workflow is the most salient characteristic of these integrated applications.

SAP, IBM, Oracle, Microsoft, Sun, Siebel, and PeopleSoft have all added new e-learning functionality to their product lines in the past year. They've redefined e-learning as a core business process that must be automated like any other business process. They contend that, like other automated business processes, learning must be integrated into enterprise application suites.

These new integrated enterprise application suites are the catalysts for two watershed developments in the enterprise: 1) migration away from courseware as a corporate performance improvement method and 2) adoption of true

performance support embedded in workflow.

Customers are steadily migrating away from courseware-based e-learning products and enthusiastically adopting next-generation, real-time embedded workflow products. They include

- business process management (BPM)
- simulation, workflow automation
- multi-user collaboration workspaces
- instant messaging
- automated expertise mapping products
- workflow optimization products.

Those next-generation workflow products are characterized by task-specific, real-time contextual content and simulation embedded in the workflow, and real-time multi-user collaboration in virtual workspaces. Training professionals need to have a basic understanding of the range of applications that are being integrated with learning and performance technology. They need to understand the performance improvement benefits that are available to them in the goldmine of data assets that reside in these applications. In particular, they need to have a firm grasp on the emergent property that results from the integration of these technologies.

This emergent property is workflow.

The lingua franca

Vendors from previously distinct industries are innovating extraordinary new convergent learning technologies and integrating them into product suites. The applications they're developing are known by a bewildering array of three-letter acronyms. What's needed is a roadmap of these new technologies in a cohesive taxonomy to help learning professionals understand this brave new learning world where workflow trumps courseware. These new product suites are being assembled from a variety of separate technologies and applications via an integration methodology known as enterprise application integration. EAI is the first three-letter acronym that training professionals need to absorb. The dominant EAI technology is what is known as Web services.

There are only two words that training professionals need to master when they deal with Web services: *publish* and *consume*. Applications built with Web services publish and consume small chunks of information to and from other applications that are built with Web services. E-learning platforms built on Web services publish and consume information from enterprise application (EA) suites. VCampus and Element K are examples of vendors that are already Web services-ready. The recent integration of Element K's technology with Saba's Java technology at Kinko's used Web services to rapidly tie the two platforms together. So, enterprise application integration (EAI) is important not just for integration with other business applications, but also for the seamless integration between two (or more) learning technologies.

In the brave new learning world order, EAI is the most dominant characteristic of second-generation learning technology.

Three types of integration

Enterprise application integration in second-generation learning technology is characterized primarily by these types of technical integration:

- wide, automated cross-business application integration
- deep super-stack or server-stack integration
- tailored presentation-layer integration in hybrid applications accessed via highly personalized portals (defined by business rules and personalized to a job role).

Across the board. The cross-business integration involves tight *and* loose coupling with other automated enterprise business processes defined by a slew of acronyms such as ERP, CRM, SCM, KM, CM, and now LMS and LCMS. Those acronyms are organized in several clearly discernable functional categories in the real-time extended enterprise (REE).

Look out below. The deep super-stack (sometimes called the server-stack) integration involves a layered vertical integration. From the bottom up, the layers of the super stack are platforms, application server and databases, enterprise application integration, transactional logic and content management, business process management (business rules), and the presentation layer known as the workflow portal.

The significance of this new super-stack environment is that learning technology and content must now adapt to this new technology and automated business process environment. Many vendors have recognized that and have begun to market products and services that map to this new learning world order. Plateau, Click2learn, Saba, Docent, and Blackboard are just a few of the suppliers that have upgraded their platforms to be very integration-friendly.

Beyond blended. The assimilation of several application features from different applications into a

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single portal—tailored presentation-layer integration—is a fundamental shift in the presentation layer of business productivity software. Those aren't Web portals that aggregate links; they are transactional portals that launch discrete feature sets and functions from many different applications in a hybrid presentation interface. Which features are present is determined by business process management (BPM) defined business rules.

One overwhelming and immediate consequence of the adoption of hybrid presentation portals is the demise of conventional application end-user training. Until now, end-user training was discrete vendor product training. Discrete products have been superceded by an aggregation of product features from several different products from several different vendors. End-user training in a single product becomes useless to a business worker. There is no escape from that fact, even for field-based staff.

More than half of the U.S. workforce is employed in field-based or floor-based (factory, retail, and so forth) jobs. They don't spend their days sitting at a desktop computer. Very recent (and rapid) adoption of wireless technology and embedded manufacturing technology is connecting these workers to enterprise technology. The vagaries and constraints of their interfaces to that technology are defining unusual and highly innovative performance improvement products that bear no resemblance to conventional e-learning.

For example, RFID (radio frequency identification) chips are now being implanted in a vast array of products such as tires, razor blades, cigarettes, clothing, packing crates, mechanical parts, and name bands given to children that visit Dollywood. These chips, or smart tags, contain procedural information that's beamed via radio waves to a worker holding a handheld wireless device. The footprint of the device, the context of the task, and the environment of the performance are all incompatible with courseware-based learning, but they're all perfect conditions for real-time, contextual decision support. A similar phenomenon is sweeping the factory floors of the industrial sector. That too entails RFID, but also embedded machine intelligence and predictive maintenance. Essentially, the machines "ask for" (if not demand) maintenance and operational tasks based on embedded intelligence.

Workflow

The natural result of this pervasive integration and assimilation is the emergence of next-generation performance improvement content embedded in the real-time extended enterprise (REE) eco-system. That content is woven tightly into the fabric of the automated workflow. It's not courseware. There is no time or place for conventional events of instruction in the automated workflow. Learning is now a core collaborative business process integrated with several other business processes. Learning is experienced as a by-product of real-time collaboration with people and machines in the context of workflow.

Gagne-like events of instruction now become cumbersome, inefficient, and costly in terms of time and money. In particular, the sequential transfer process that requires skills and knowledge transfer followed by a subsequent learning transfer to the job is now seen as inefficient. It's not a question of instructional effectiveness, but rather a question of compatible product design. It isn't that Gagne's method doesn't work in general; it's just incompatible with the real-time workflow in the workplace.

The demand for compatible learning products has sparked a wave of innovation. These new innovations are occurring in many industries. Unencumbered by the constraints of conventional learning theory, some companies are pioneering extraordinary real-time performance improvement products. The enterprise customer demand for integration, optimization, real-time collaboration, and embedded business alignment has created an emergent technology and business process methodology referred to as the real-time extended enterprise.

The real-time part

According to the December 2002 Database Development Survey by Evans Data Corporation, 48 per-

cent of the companies surveyed provide real-time data feeds to decision makers. Nearly a third of the 600 database developers surveyed indicated that they updated their analytic databases on an hourly basis. That's now known as the "zero-latency" trend. In the context of this new zero-latency corporate environment, there's literally no place or time for courseware or the concept of taking a course. Two enabling technologies that are becoming integrated with these real-time workflow applications are instant messaging (IM) and presence awareness.

Instant messaging has begun to proliferate rapidly in enterprises as an instant performance support technology. Once the domain of consumers, it is becoming integral to corporate workflow, knowledge management, and collaboration technology. It is the core technology used in the "Find an Expert" feature found in most of the enterprise application suites. PeopleSoft calls its, "Resource Finder." E-learning vendor Hyperwave has integrated IM and presence awareness technology from Bantu into its knowledge management and e-learning platforms. Bantu is already used in the U.S. Navy's knowledge management portal known as Navy Knowledge Online (NKO).

According to Bantu, "A sailor at sea with a complex electronics repair project searching the portal for the engineers at the design facility on shore can then see their online availability and immediately communicate with them to obtain critical repair information." Bantu is also integrated into the Web-conferencing technology of WebEx. That enables corporate users to call ad-hoc virtual meetings based on the real-time availability of online workers. IBM claims it achieves US$400 million in annual savings by using collaboration technology for e-meetings, e-learning, and instant messaging. Lotus Sametime Everyplace 3 is a new wireless instant messaging product specifically designed to extend Sametime's IM and presence awareness to wireless devices, mobile phones, smart phones, and handhelds. Microsoft's PlaceWare RapidMeeting is one of the first hosted Web-conferencing services to provide customers with one-click instant meetings. PlaceWare customers can initiate instant Web conferences using Microsoft Windows Messenger. Advanced Logic Systems, or ALSI, sells a product called WorkQuick as part of its Collaborative Work Environment architecture, which creates and tracks workflow with real-time collaboration and 360 degree communication.

The concept of 360 communication and collaboration extends the real-time metaphor to include the idea of "real time, all the time." Just-in-time is too late.

All of these technologies are now undergoing intense convergence with integrated application suites. It's that integration that is enabling the extension of the enterprise and the subsequent emergence of pervasive workflow.

The extended part

There are four meanings usually implied by the term *extended*:

1. technical integration that includes the three types of integration described above
2. integration of that technology with business strategy *and* workforce performance
3. extension of application technology across back-office and front-office functions
4. extension of user interactions beyond enterprise employees to customers and partners.

That extension across other business applications, down through the stack and around tailored portals, is the attempt to bridge the islands of automation inherent in legacy solutions and even best-of-breed solutions. Applications in any business family of applications should play nice together. The integration of that technology with a company's vision or business strategy is also vital. The current wave of business process automation is extending that concept one step further and trying to physically link systems and strategy with the daily work performance of employees—now made possible by ubiquitous workflow.

Back-office, front-office, the same?

ERP and HR systems developed as back-office applications are internal to an enterprise. CRM and SCM systems developed as customer-facing are front-office applications. Those applications are now being integrated to create a workflow that not only integrates autonomous business units inside a company, but also weaves in the customer and supplier interactions in outward-facing applications.

The need to optimize workforce performance and supply chains is extending the user-base outside the enterprise to include not only employees, but also customers and partners. Partner relationship management (PRM) vendors such as ChannelWave and Alegis have already integrated learning delivery and management into their platforms and are finding a ready customer base for solutions that

have native partner and supplier training technology.

Workers across vertical industries who don't sit at computers all day are now being connected to enterprise applications via wireless handheld technology. Wireless technology is being used to extend the enterprise beyond back-office and front-office to employees in the field. Those field workers are being provided with real-time performance support in the form of augmented reality, collaboration with experts, and automated contextual coaching. The real-time extended enterprise has created the conditions necessary to allow the emergence of a fundamentally new type of working dynamic known as workflow.

Two plus two equals five

Workflow is an emergent property that results from the combination of these new real-time technologies embedded in integrated enterprise application suites. The dynamics of cybernetic workflow can only be analyzed and visualized by simulation. No static or linear analysis can capture the breadth of the workflow. One key principle of emergent systems is that their behavior can't be predicted or managed by analyzing individual parts. Simulation is the only way to visualize "as is," "to be," and "what if" scenarios.

In the brave new learning world order, workflow is an emergent property of the real-time extended enterprise. Simulation is the only way to optimize workflow.

That emergent workflow is still nascent in today's solutions, and the difference can be subtle. For example, in the PeopleSoft enterprise suite, learning objectives can be created from anywhere in the greater application suite. At first glance, that might not seem overly important. But the significance is that performance is now being modeled at the system level. Workflow, not a worker's performance, is being optimized. That worker's performance is affected (sometimes directly) by changes to the system, but it isn't the primary improvement target.

For example, to offset declining revenues in one region, a manager might increase the production in a region that's enjoying brisk sales. The goal is to improve the performance of the systemic workflow. That's now called corporate performance management (CPM). Business managers can mandate intervention wherever they find performance issues. That could be while analyzing financial data, while accessing HR systems, or while modulating supply chain metrics. Under those circumstances, learning technology becomes just one of many system elements that can be brought to bear on the broader corporate performance.

A rose by any other name isn't a rose

Pure-play vendors sometimes say that the native learning technologies that are now part of these integrated enterprise application suites dilute the functionality of a robust best-of-breed solution.

That's not completely accurate, but it does reflect the recognition that something is indeed different about the learning technology in these suites. That difference is present regardless of whether the learning technology is native or a best-of-breed solution integrated via EAI.

In the brave new learning world order, once learning technology becomes embedded in integrated enterprise application suites, it becomes subject to the business rules of the system's workflow.

Workflow is an emergent property. The definition of an emergent property is that the sum is greater than the parts. The aggregation of those parts creates a fundamentally new entity that's more than the mere sum of the parts. An emergent system can't be analyzed by breaking it down to its constituent parts; it has to be analyzed as a holistic system. The only way to model and predict behavior in an emergent system is by simulation. As real-time workflow becomes the dominant working environment (inside the office and out in the field), workflow modeling tools are replacing traditional learning content design and development tools. Traditional authoring tools are designed to generate courseware. BPM and workflow modeling tools are designed to model, automate, and simulate workflow.

That difference is fundamental.

Geary Rummler and Alan Brache are perhaps the strongest advocates for that type of modeling in the learning industry. They've been advocating this approach for many years. The Kirkpatrick analysis defines training as a process, not a discrete event. The original "worker-focused" concept of electronic performance support (EPS) was extended by Barry Raybould to incorporate the dynamics of workflow. That has effectively created the theoretical groundwork for second-generation EPS systems that map to workflow.

Workflow analytics, sometimes called workflow process analysis or workflow modeling, is an effi-

cient method used to map performance. It's identical to traditional task analysis performed by instructional designers, but it's done with very sophisticated methodologies and tools. The difference between traditional task analysis and workflow analysis is that workflow analysis measures performance in the context of the integrated business process matrix. It's a system-wide analysis. That system-wide workflow analysis models the system dynamics of the people and machines that are now co-participants in the enterprise workflow. The analysis provides a clear snapshot of what's known as the "as is" condition. The process improvement (workflow optimization) modeling defines the "to be" condition. Workflow modeling tools can simulate a variety of "to be" and "what if" conditions to determine the optimal "to be" state.

In the brave new learning world order, simulation is the most dominant characteristic of second-generation learning content.

In a nonintegrated configuration, learning technology is confined to mapping and managing isolated workforce performance relative to the enterprise eco-system. That's not a weakness of the technology but a core functional purpose. It wasn't designed to be aware of the systemic aspects of the integrated enterprise eco-system. It was designed to focus on workers and not the combination of workers and systems in the context of a holistic system. That's true for all dedicated business applications.

Once that technology is fully integrated, it can still function as a dedicated workforce performance management technology (it can be accessed in isolation), but it now becomes a component of an eco-system that maps, models, and manages workflow. As defined by workflow management principles, participants in the workflow include people and systems. The Workflow Management Coalition defines workflow management as "the automation of business procedures, or workflows, during which documents, information, or tasks are passed from one participant to another in a way that's governed by rules or procedures." In the WFM model, a participant can be a person or a system component.

New tools for performance technologists

As real-time workflow becomes the dominant working environment (inside the office and out in the field), workflow modeling tools are replacing traditional learning content design and development tools. Traditional authoring tools are designed to generate courseware. Business process management and workflow modeling tools are designed to model, automate, and simulate workflow. The difference is fundamental.

It's important to point out that systematic approaches to instructional design originated in the early cybernetics models of systems science theory. The original ISD models emphasized a strong dependence on constant iterative evaluations of the development and delivery process. That proved to be too expensive to do in almost any corporate courseware development project—until the advent of the new BPM and process simulation tools.

Squeezing costs out of the flow

One of the most common goals (and phrases) in business process management is "squeezing the costs out of the flow."

Workflow modeling practices routinely generate significant and continuous ROI. The ROI achieved with business process management is global across the enterprise. Because BPM is a cybernetic and continuous process, it also generates continuous ROI. And it's adept at identifying elusive hidden costs.

The ROIs achieved with first-generation e-learning are local to training activities and training procurements. First-generation learning products generate one-time discrete ROIs associated with the reduction of travel, facilities, and trainer costs. Those have been identified as first-tier ROIs and have isolated (if not exposed) the second-tier ROI needs defined as business performance improvement.

The issue of whether first-generation learning products can achieve second-tier ROIs has been severely compromised by the massive (60 to 70 percent) no-show and drop-out rates endemic to first-wave deployments. It's not a question of instructional effectiveness but product design.

In the brave new learning world order, at a fundamental business level first-generation e-learning content products based on courseware models are incompatible with real-time contextual workflow.

Workflow modeling practices are designed to continuously and simultaneously "squeeze costs out of the flow" and improve business productivity. The concept of tiered ROIs is irrelevant in an integrated real-time extended enterprise.

Workflow routinely generates significant ROI.

The taxonomy

The taxonomy presented here is the first attempt to model the apparent complexities of the convergent enterprise application landscape. It's a method to pare down that complexity into manageable mind maps.

The following quadrant system segments the applications into four primary functional areas. It is a function-centric model designed to map to the dynamics of the workflow in the real-time extended enterprise.

These quadrants of enterprise applications suites will converge into a single enterprise suite within a very short time. Most analysts, though not identifying any standard taxonomy, still expect a single convergent application category to emerge over the next two to three years. The four functional segments of the real-time extended enterprise are

1. resource management
2. collaboration management
3. process management
4. product management.

Those quadrants map to the four simulation categories defined by Alessi and Trollip. They also map to the four components of the Balanced Scorecard and the four phases of the new process-centric ISO9001:2000. And they correspond to several iterations of Six Sigma systems.

Those four quadrants are subsumed under the mnemonic, "People and systems collaborate in a process to produce products and services."

People and systems. Resource management includes applications designed to create inventories and map tangible assets (resources). Resources include people, property, machines, systems, and data assets such as e-learning content. Unstructured asset maps and inventories are the primary output. They're unstructured in the sense that there's no context or temporal aspect integrated with the data in these systems. They are repositories and file storage systems.

First-generation HR systems are silos of basic employee information. Competency mapping and skills management features in these point solutions are laundry lists—simple inventories of skills and certifications, usually self-reported by employees. This quadrant contains a growing list of asset mapping applications, including

- human capital development (HCM)
- unstructured knowledge management (UKM)
- enterprise resource management (ERP)
- employee resource management (ERM
- employee performance management (EPM)
- learning management system (LMS)
- learning content management system (LCMS).

A robust process of micro-convergence is occurring within this quadrant. That's clear in the recent inclusion of LMS products into the product suites of Sun, SAP, Oracle, PeopleSoft, and Siebel. The skill inventories are increasingly becoming iterative when linked to suites that include automatic skill indexing. Business managers are the primary users in this quadrant.

People and systems *collaborate* in a process to produce products and services. Collaboration management includes structured events, processes, and experiences. Simply put, it is work. That includes synchronous and asynchronous events, but it's moving towards synchronous experience in light of the proliferation of instant messaging and presence awareness.

Enterprise content management is included in this quadrant because new products in this industry are highly collaborative—for example, the new automated content-creation features of products from vendors such as AskMe, Tacit Knowledge, and Autonomy. Stratify, H5Technologies, Applied Semantics, and Mohomine also fit in this category. They create taxonomies and semantic contexts by analyzing content in structured processes such as email and phone conversations. This quadrant contains applications that include

- structured knowledge management (SKM)
- enterprise content management (ECM)
- instant messaging (IM)
- presence awareness (PA)
- collaborative Web-conferencing
- enterprise collaboration management (ECM)
- expertise mining.

Collaboration is the exchange of information and knowledge. That can be structured or unstructured knowledge and collaboration. Unstructured knowl-

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edge is the domain of traditional content and KM systems and considered part of resource management in this taxonomy.

Structured knowledge and collaboration is what's captured in the analysis of expertise automation, data conferencing, e-learning, and people-to-people communication. Collaboration participants (employees, customers, and partners) are primary users of technology in this quadrant.

People and systems collaborate in a *process* to produce products and services. Process management is dominated by analytical functions. Analysis is the prime output of these applications. Metrics and indexes are evaluated. The primary analysis target is the workflow itself. As defined by workflow management principles, participants in the workflow include people and systems. Business intelligence mined from the workflow is the most significant nuance of this quadrant. This analysis includes interactions with customers. Customer analytics is a rapidly maturing technology and expanding to include employee and partner analytics.

This quadrant has an unambiguous correspondence to the measure and analyze components of the various Six Sigma systems. Decision makers are primary users of technology in this quadrant.

This quadrant includes

- business process management (BPM)
- business activity monitoring (BAM)
- corporate performance management (CPM)
- workflow management (WM)
- business intelligence (BI)
- customer analytics (CA)
- workforce analytics (WFA).

All of those systems measure and analyze workflow. The output of that analysis is primarily displayed as simulated data visualization in dashboards. These dashboards display simulations that are essentially identical with process simulation as defined by Alessi and Trollip.

People and systems collaborate in a process to produce *products and services.* Product lifecycle management is the link between employees, products, partners, and customers. It's the actual compliance with business strategy and adherence to defined (sometimes rigid) work tasks embedded in the workflow.

This quadrant includes

- product lifecycle management (PLM)
- product data management (PDM)
- supply chain management (SCM)
- salesforce automation (SFA)
- workforce optimization (WFO)
- workforce management (WFM)
- customer relationship management (CRM).

Workflow participants (employees, customers, and partners) are the primary users of technology in this quadrant.

Based on that taxonomy, it's now possible to see e-learning as just one of the functions of the extended enterprise. It can also be viewed as a system that weaves the quadrants together as a process-oriented learning methodology.

In the real-time extended enterprise, business processes (a.k.a. workflow) are paramount. Integrated business process management creates a dynamic workflow matrix in constant flux, flowing in real time.

That is fulfilling the promise of organizational learning. Organizational learning and workflow optimization are essentially identical. Vendors that market solutions mapped to the dynamics of the real-time extended enterprise will be able to compete effectively as best-of-breed solutions. They'll need to accommodate the REE in a best-of-breed suite. At the very least, they need to adopt portal technology and Web services to align to REE installations. That will require full-featured and integration-friendly, performance-centric suites comprising

- simulation-based workflow object asset management
- real-time collaboration and workflow object content development and delivery
- extended workforce and workflow analysis
- embedded workforce procedure alignment (compliance engines).

All are present in form or another in newer iterations of product lines. For example, compliance engines are embedded in learning platforms. Plateau and EduNeering are leaders in that space. Docent

and Saba added analytics to their products.

Business intelligence (BI), business activity monitoring (BAM), and business process monitoring (BPM) used to be confined to analyzing system processes. New applications from vendors such as Cognos, Business Objects, FileNet, and Lombardi now track and interact with systems and human responses in the context of the workflow in near real time.

The Lombardi TeamWorks product features a coaching feature inspired by Vince Lombardi of the Green Bay Packers. When a problem or exception occurs, a process coach goes to the relevant back-office systems to collect the background data automatically, present it to an employee, and coach that person or several people through the process of remedying the situation. PeopleSoft's intelligent context manager proactively prompts employees with relevant (role-based) information when they initiate transactions in enterprise applications. According to PeopleSoft, "Contextual information is automatically displayed, enabling users to intelligently navigate through the business process."

Welcome to the brave new learning world of workflow. A new world dominated by real-time workflow requires new forms of learning technology, content, and services. In such a world, workflow will always trump courseware. TD

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