

# The Convergence of eLearning, Simulation, and Enterprise Application Suites

If your future depends upon enterprise integration, eLearning, Web services, or the real-time enterprise, you *must* read this groundbreaking research from Sam Adkins and Internet Time Group. Our findings are current as of mid-August 2003.

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## Workflow-Based Learning™

### Our premise.

by Sam Adkins, Principal, Samadico

Recent advances in enterprise technology from several industries make the “learn first, perform later” process, inherent in conventional training and elearning, costly and inefficient. New innovations in enterprise technology can measure performance skills and provide remediation in real time, on the job, and in the context of an employee’s workflow.

Enterprise technology is in the midst of an accelerating process of integration and convergence. Previously distinct product categories are being assimilated into integrated enterprise application suites. Learning technology is one of those product categories being drawn into the suites. SAP, IBM, Oracle, Sun, Siebel and PeopleSoft have all added new elearning modules to their Enterprise Application (EA) suites in the last year. They have redefined elearning as a business process and assimilated learning technology into their ebusiness suites. Those suites are tightly integrated with business process management technology.

### Next-generation performance improvement

The consequence of this inexorable convergence and assimilation is the emergence of next-generation performance improvement technology, content and services. Large and small enterprise application vendors from several industries are innovating completely new product lines that have a direct and immediate impact on performance improvement. These innovations are characterized by:

- Task-specific, contextual content and simulation embedded in the workflow.
- Real-time multi-user collaboration in virtual Workspaces

These new technologies are the catalysts for three watershed developments in the enterprise. They include the:

- Migration away from courseware as a corporate performance improvement method.
- Adoption of skills, knowledge and affective learning fused in workflow applications.
- Integration of contextual collaboration and Web Services technologies with advanced learning technology in the enterprise.

### New tools optimize workflow

Vendors like SAP, Epiance, Knowledge Impact, Knowledge Products, eHelp and x.hlp are providing tools that embed performance support and simulation directly into applications. These tools are not designed to create courseware. They are designed to create and embed simulation-based performance support objects directly into business applications.

Business Intelligence (BI), Business Activity Monitoring (BAM) and Business Process Monitoring (BPM) used to be confined to analyzing system processes. Now they are being used in convergent workforce optimization applications. Products from vendors such as Cognos, Business Objects, FileNet and Lombardi now track and interact with systems *and humans* in the context of the workflow in real time.

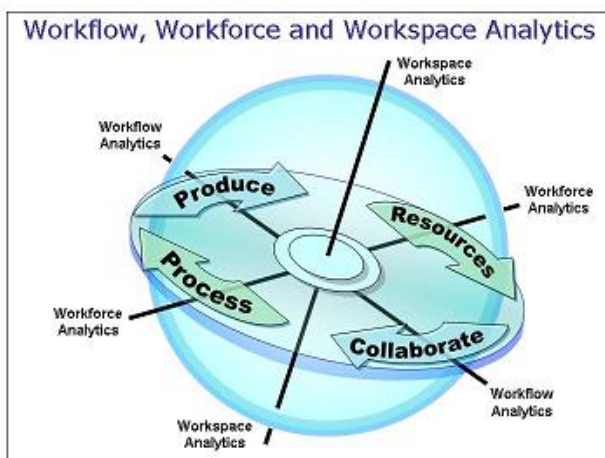
Business process management is being tightly integrated with learning technology. Docent’s new workforce analytics product is an example of this trend. Indeliq and Hyperwave integrated ILOG’s business rule management technology into their product suites. Hyperwave

has gone a step further and integrated a robust workflow and business process management functionality into their Hyperwave eKnowledge Suite.

PeopleSoft's Intelligent Context Manager "proactively" prompts sales people in the field with relevant information. According to PeopleSoft, "contextual information is automatically displayed enabling users to intelligently navigate through the business process." Information provided by employees in the field is used to update CRM and SCM systems in near real time (field personnel refer to this as "feeding the beast").

## Situated learning

Situated Learning stresses authentic context as the primary design criteria and challenges the notion that learning takes place as a result of instruction.



Field-based certification, virtual lab and simulated lab products are indications of this move away from instructor-led models in IT training. Simulation-based contextual curriculums and game-based business simulations such as those developed by Socratic Arts and games2train.com are examples of this type of product in the broader education and training market.

Products like these reduce the need for conventional training and certification, since an employer can assess, train and track employees while they work. Customers are using these technologies to avoid a wide range of training expenses, including the cost of

instructional designers. These tools are designed to be used by subject-matter experts, business managers and decision makers, not courseware designers.

## Performance objects

Ironically, the demise of courseware may not be the demise of learning objects. In fact, it may prove to be the vindication of learning object standards. The emphasis now shifts away from learning towards performance. Learning is indeed taking place but as a natural by-product that results from interacting in the workflow. Workflow, not courseware, is the "carrier wave" of situated learning,

In the context of real-time workflow applications, the use of single, granular *performance* objects becomes practical and efficient. In this context, they are not used in courseware or instructional sequencing but in the context of on-the-job asymmetric workflow.

In today's economic climate, customers want immediate, measurable and observable workforce improvement results (concepts familiar to both performance technologists and CFOs). The customer demand for optimization is driving the demand for real-time technology. This is what is now known as the Real-time Extended Enterprise (REE).



## Why this matters

by Jay Cross, Founder, Internet Time Group, and CEO, eLearning Forum

If the hare and the tortoise were to rerun their famous race, the hare would win. The slack has been knocked out of the system. No one naps. Competition is continuous, and it takes place in real time.

## Interoperability has finally arrived.

Major corporations around the world have automated huge chunks of their operations with ERP, CRM, SCM, and other enterprise systems. Each has consolidated thousands of job-shops and piecemeal operations. They have replaced family farms with collective farms, but it hasn't been enough. Production remains unconnected to consumption. Three or four mammoth silos stand where hundreds once stood.

Now Web services are forging links between the remaining silos. They are plugging together information flows like so many Lego blocks. Applications are talking to applications. IT's Tower of Babel is eroding. The computers of suppliers, producers, partners, sellers, and buyers are all speaking the same language. Interoperability is becoming a reality, and the real-time corporation is being born.

Take a robust ERP or CRM system. Add collaboration. Add enterprise content management. Add product life-cycle management. Add business process management. Add simulation and real time eLearning. Each element makes the enterprise system more powerful, but the resulting real-time enterprise is greater than the sum of these parts: it links strategy and execution in real time.

## The business ecosystem is responsive.

I remember my excitement many years ago as I read about "Executive Information Systems" that would seat senior managers in front of a dashboard of as-it-happens information for decision-making. What's about to happen is so much better.

A real-time enterprise system gives every knowledge worker a dashboard. What's more, it also provides a steering wheel, accelerator, and brakes for acting as well as observing. By disseminating information about the current situation and decision-support to all levels, the whale of an organization becomes as agile as a school of fish, each acting independently but headed in the same direction. By squeezing the float and inefficiencies out of communication, the organization's reaction time heads toward zero.

## The first time I heard Sam Adkins...

When I heard Sam Adkins describe his vision to the monthly meeting of eLearning Forum a year ago, I found out more about the future of enterprise learning in 45 minutes than I had in the previous year. I called Sam to explore how we might work together.

It turned out that Sam had worked first as an employee and later as a consultant to Microsoft. He set up the first online learning business in the world (Microsoft Online Institute). His entire career has focused on online learning. He has read the latest reports from all of the major research houses; he felt they didn't "get it." He has developed the most all-encompassing, logical, up to the minute analysis of enterprise integration and the eLearning that is part of it.

## Internet Time Group

Before hearing Sam, I thought I understood where application integration was headed and what that would do to eLearning infrastructure. The computing and learning fields are not new to me. I was selling and programming mainframes before integrated circuits and disk drives were invented. I wrote the very first business program for what has become the University of Phoenix. My company, Internet Time Group, has advised many of the top eLearning companies. I'm CEO of the eLearning Forum. Naturally, I thought I had things figured out.

Then Sam opened my eyes to the sea change that's just now starting to sweep through IT. I scaled back Internet Time Group's consulting activities to make time to promote our vision of workflow-based learning™. I want to ride this wave. I am absolutely delighted that we are publishing Sam's *Simulation in the Enterprise*, the first comprehensive description of the emerging real-time extended enterprise and the eLearning that will be integrated into it.

Over the next six months, we'll inevitably be working with partners, promoting the services we believe in, communicating our findings through other media, and helping pioneering companies sell their wares. Experience has taught me not to dream too far ahead of my customers. Call or email me if you'd like to explore what we should be doing with you.

Jay Cross, Founder, Internet Time Group  
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## Where to start

Sam Adkins and I assembled this overview to introduce you to the new shape of learning in the real-time enterprise. Scan the tables of contents and indexes. Read the summaries of the four individual reports. If you want to learn more about the trends, the players, and the logic underpinning the next wave of computing and employee learning, license one or more of Sam's four reports.

1. The first report describes the customer pain points that are driving vendors to innovate astonishing new learning technologies for the real-time, workflow-oriented enterprise.
2. The second report includes an overview of the learning technologies now available from a wide range of enterprise technology vendors including IBM, Microsoft, Sun, Siebel, Oracle, PeopleSoft, and SAP – and their likely impact on the eLearning industry.
3. The third report discusses next-generation learning technology such as Workflow-based eLearning, workforce analytics and introduces a Continuous Workflow Performance Improvement framework and a Real-time Extended Enterprise Taxonomy.
4. The final report describes the innovators bringing astounding new elearning technologies to the market, such as workforce analytics, intelligent "bots", embedded learning, artificial experts, expertise mapping, and more.



Order your reports online at [www.internettime.com/shop](http://www.internettime.com/shop). Reports are \$250 each or \$750 for the set of four.

## We wrote these reports for:

**Vendors, Consultants, and Implementers** of enterprise software, integration services, and learning management systems learn a framework for providing advice, educating customers, and making decisions.

**C-Level Executives** learn how to “squeeze cost out of the flow” and meet the productivity needs of their business. The ability to link business strategy to enterprise technology *and workforce performance* has been the Holy Grail of executive management. This series delineates technologies and methods that accomplish this goal.

**Product Designers, Product Planners and Marketing Directors** profit from the product migration trends clearly mapped in this series. Innovation of next-generation products has always been the core attribute of best-of-breed companies.

**Learning Professionals** across the spectrum of the enterprise benefit by the real world tactics and strategies presented in the series. They learn how to use the Real-time Extended Taxonomy to map the learning assets in your company. The Continuous Workflow Performance Improvement framework allows them to map an effective enterprise-wide performance improvement process over their technology assets.

**Chief Learning Officers** learn how to integrate business strategy, enterprise application technology and workforce performance with new real-time workflow-based performance frameworks.

**Training Managers** learn how to meet the needs of their trainees and the needs of their executive management. They are provided with a coherent framework that takes the confusion out of the rapid integration of learning technologies with enterprise application suites.

**Training Buyers** under budget constraints discern how to mitigate the drop-out problem and procure sustainable solutions that integrate with assets they already own. Learn how to capture informal learning, align the workforce, reduce lag time and mitigate the so-called 80/20 performance patterns.

**Trainers** discover that the expertise they have cultivated now becomes the most valuable asset that the company needs. They are the prime learning sources in modern expertise mapping technologies and new contextual collaboration technologies. Expertise in human-to-human collaboration is now sold at a premium.

**Instructional Designers** learn how their skills can be leveraged in the development of new real-time, contextual content and simulation embedded in workflow. They discover a whole new set of tools and methods that make them even more valuable in the enterprise.

**Elearning Developers and Performance Technologists** are introduced to extraordinary new performance improvement tools, technologies and methods. Real-time performance improvement and support has always been the goal of the electronic training movement. That goal is now being realized.

**Business Process Analysts and Simulation Designers** discover that their talents are now in high demand in the enterprise. Learning has been defined as a core business process in the enterprise and these professionals model, simulate and automate learning like any other business process.

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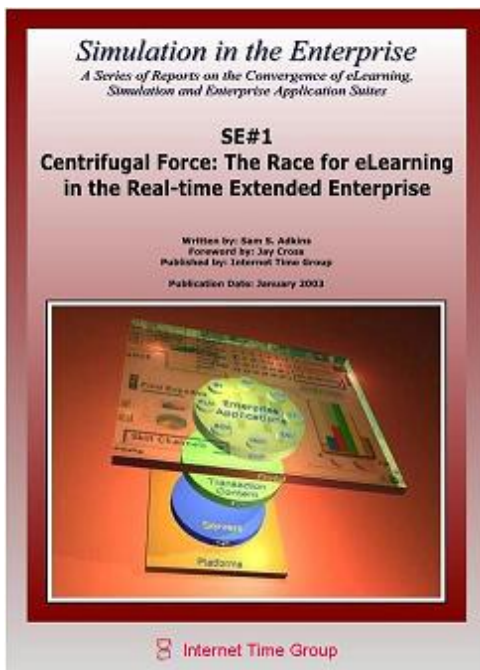
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## Summary of Each Report

### Centrifugal Force: The Race for eLearning in the Real-time Extended Enterprise



The first report in this series describes the market factors and the economic conditions that are driving elearning and performance improvement technology into enterprise suites. It describes the "pain points" of vendors, customers and users.

This report highlights the vendors from several previously distinct industries that are now focusing on a single convergent performance market. Along with the enterprise vendors, the vendors discussed in this report include: Simulation and Training, Product Lifecycle Management, Business Process Management, Collaboration, Enterprise Content Management and Enterprise eLearning.

Each of these industries has experienced failures with first-generation products. Those failures have become the design criteria for second-generation product development. The "lessons learned" have been carried forward into innovations in new product lines. Second and third-generation product cycles are now being launched by all of these industries.

Elearning, Enterprise Collaboration, Product Lifecycle Management, and Enterprise Content Management have just entered a distinct second-generation stage. The Simulation and Training, Business Process Management and Enterprise Application product lifecycles are more mature than the others. They are entering third-generation product phases.

First-generation elearning products based on courseware models were designed primarily to meet the cost cutting needs of training buyers. They do not meet the needs of the workers who are supposed to use them.

This has resulted in the paradox inherent in the dichotomy between the high-volume sales of elearning courseware and the extraordinarily high rate of "no-shows and drop-outs". The drop-

out problem is a clear indication of a product design issue and not a motivational or organizational problem that needs to be fixed.

These products have only partially met the needs of the buyers. The first-generation products, now often called “first wave” products by industry veterans, meet the buyer’s need to cut costs, but do not meet their need to improve productivity or align the business strategy with workforce performance.

Workforce performance is primarily an issue of change management. Change management is the most difficult task that enterprises face when they integrate and optimize their systems and processes. The customer demand for integration is directly related to the need to cut costs and improve profits. The demand for optimization is the result of the need to increase productivity.

Optimization is being driven by the need to do more with less in a climate of reduced budgets and downsizing. Once those two things are achieved, the change management issue is exposed as the real challenge. The most illusive goal of change management, so far, is workforce performance compliance.

The “holy grail” is the demand to physically align technology and business strategy with employee, partner **and customer** performance. This is identical with the need to “bridge” IT systems and business strategy but extends this bridging metaphor to include the alignment of workforce performance.

This report describes the new product innovations resulting from the integration of enterprise application suite technology, business strategy and workforce performance. They are designed to meet the needs of both buyers and users.

**Convergence Vectors and Innovation Inflection Points**

Convergence vectors are the areas where the product lifecycles from these previously distinct industries intersect with each other. Innovation inflection points are the most prominent innovations coming from each sector.

<b>Industry</b>	<b>Convergence Vectors</b>	<b>Innovation Inflection Points</b>
<b>Simulation &amp; Training Industry</b>	Simulation, Multi-user Collaboration	Artificial Intelligence, Psychomotor Learning, Asymmetric Collaboration in BattleSpace
<b>Enterprise Collaboration</b>	Multi-user Collaboration	Asymmetric Collaboration in WorkSpace
<b>Product Lifecycle Management</b>	Simulation, Multi-user Collaboration	Simulation, Embedded Performance Support, Rapid Prototyping
<b>Business Process Management</b>	Simulation, Real-time Communication	Real-time Data Integration, Animation of Workflow
<b>Enterprise Applications</b>	Real-time Communication, Multi-user Collaboration	Cross-technology Integration, Presence Awareness, Transactional Portals, Wireless Connectivity
<b>Enterprise Content Management</b>	Multi-user Collaboration	Virtualization of WorkSpace, Portals
<b>eLearning</b>	Simulation, Multi-user Collaboration	Simulation, Embedded Performance Support

One unmistakable pattern of convergence is the number of companies that already have products in the different competing industries discussed in this report. Each year, the larger companies add product lines to their suites to tap the revenues in the previously distinct

markets. Another strong indication of convergence is the arrival of transactional portals in late 2002.

The transactional portal is essentially a customized web interface that aggregates not only content but trans-application functionality targeted to particular users. Selective feature sets of many applications, defined by business rules and based on an employee's job role, are blended into a single interface.

Transactional portals will have a fundamental impact on applications training as we know it. End-user training in particular will need to migrate rapidly to solution-centric workflow training and away from product-centric training.

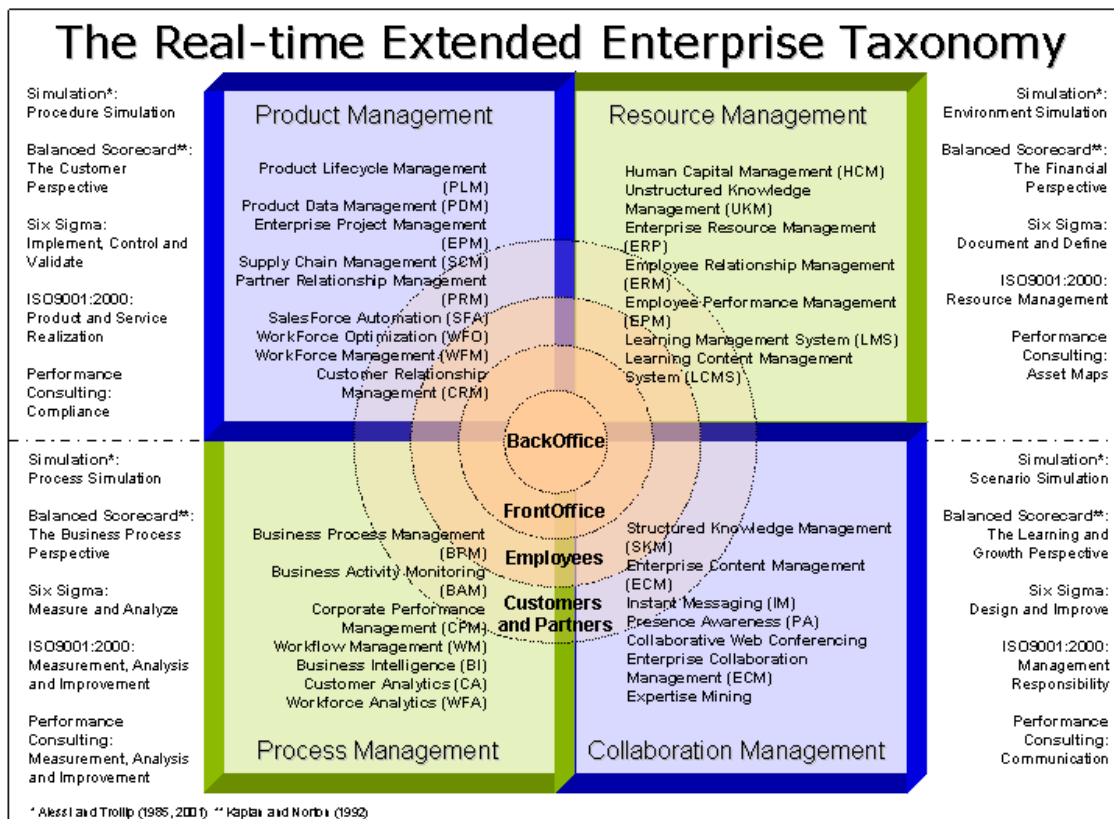
The first report defines a new enterprise application taxonomy that maps the correspondences between enterprise technology, instructional simulation, Constructivist Situated Learning design, Balanced Scorecard, Six Sigma and ISO9001:2000 methodology. It aligns these correspondence models to the convergent Real-time Extended Enterprise (REE).

There are also two diagonal "wings" of this new taxonomy that map to the way Alessi and Trollip collapsed their four simulation categories into two instructional strategies. Those two wings are expressed as "learning about things and learning to do things".

Collaboration Management and Product Management provide support for performance in the workflow in which people and systems "do things". Resource Management and Process Management provide information "about something", primarily to business managers and decision makers.

SAP expresses this in business language as, "in the end, the benefits of simulation really boil down to improving two key areas: decision support and communication."

The REE taxonomy presented in this section is the first cohesive taxonomy to inculcate the rapidly emerging technologies into a single "mind-map". It is organized around the functional quadrants of workflow. The functional quadrants are subsumed under the mnemonic rubric of *"People and technology in the workspace collaborate in a process to produce products"*.



It is important to point out that systematic approaches to instructional design originated in the early cybernetics models of systems science theory. Situated Learning grew out of the second wave of cybernetics in the 1990's and is rooted in the Constructivist movement.

The original ISD models stressed a strong dependence on the constant iterative evaluation of development and delivery processes. Until the advent of the new Business Process Modeling (BPM) and process simulation tools, that iterative process proved to be too expensive to do in almost any corporate courseware development project. These tools now fulfill the promise of the cybernetic vision of asymmetric performance improvement.

The REE Taxonomy maps to the Situated Learning model that has emerged out of the second-order cybernetic learning theory called Constructivism. Stated in Situated Learning performance terms, these systems and tools:

- Identify performance in the context of an authentic context.
- Enable the collaborative construction of skills and knowledge using authentic activities.
- Provide access to expert performance and process modeling.
- Sustain the new constructed performance with authentic contextual assessment via workflow feedback loops.

In the context of the Real-time Extended Enterprise, a competitive learning platform does not have to provide all the functions of the REE. It does have to integrate with those functions and reflect the dynamics of real-time performance in the workflow.

With the advent of workforce analytics and embedded performance technology it is now possible to see the shape of best-of-breed learning solutions. Topics covered in the first report include:

- Feel The Burn: Vendor, Buyer and User Pain Points
- The Dawn of the Real-time Extended Enterprise
- When Galaxies Collide: The Seven Industries on a Collision Path
- The Economy of Fusion: Convergent Technology, Tools, Content and Services
- The Convergent Application Interface: The Enterprise Portal
- The Convergent Enterprise Taxonomy: Overview of Enterprise Application Suites
- Best-of-Breed: The Real-time Extended Enterprise Learning Platform

## The Gravity of the Situation: The Assimilation of eLearning by Enterprise Applications

The second report highlights the vision of a wide range of enterprise application vendors including the large global enterprise software vendors like SAP, IBM, Oracle, Microsoft, PeopleSoft, Siebel and Sun. IBM has been an elearning leader for many years. The others have all added elearning functionality to their ebusiness product suites in the last year.

The dominant theme in their marketing positioning and product strategy is the clear message to customers that integrated business applications suites are superior to point solutions. Those integrated suites contain not only elearning but business process management, business intelligence, content management and, increasingly, live collaboration.

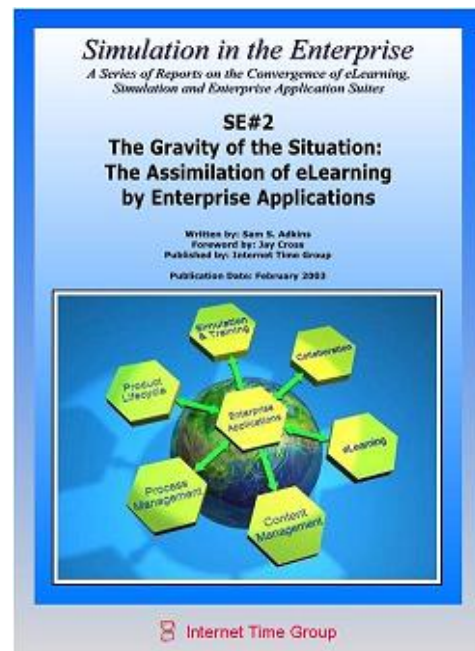
This integration message is being positioned against pure-play vendors that are characterized by the enterprise vendors as disconnected point solutions, or islands of automation, or worse, silos. Pure-plays have countered by sending customers the message that highly specialized platforms are easily integrated and offer best-of-breed functionality and value. They maintain that the mega-players will never have the business focus or the expertise to provide robust learning products.

The second report discusses the potential outcomes of the brutal competition in the market. Some elearning analysts believe that the entrenched elearning vendors have a "headstart" on the enterprise application vendors. The rationale is that pure-play elearning deployments in entrenched customer-bases will be hard to dislodge.

### **The intersection of the assimilation of learning technology into enterprise applications and the customer demand for second-generation learning products has created a profound Innovation Vector.**

There are three primary reactions from the elearning vendors in response to the encroachment by enterprise vendors. Vendors are:

- Building out their brands as a best-of-breed solution.
- Upgrading their learning product suites to facilitate integration.
- Upgrading their products with Workforce Analytics.



Yet the arrival of enterprise learning platforms presents business opportunities for agile elearning companies. Nimble service-based businesses, like SystemLink and RWD Technologies, will be able to aggressively exploit the new opportunities.

RWD has established itself as a system integrator. Their ebusiness/elearning division does both system integration and elearning deployments. They have a significant Siebel practice and integrate Siebel technology with other enterprise platforms. They have developed integrated solutions combining their products with Documentum, Saba, IBM and Centra (in other words, content management, learning technology, enterprise technology and collaboration).

Large content vendors face the daunting task of migrating product-based and courseware-based libraries to solution-centric reference content and granular, workflow simulations. Their content must adapt to the realities of the Real-time Extended Enterprise.

Many of the larger content houses have embarked on the transition to performance and simulation products. For example, SkillSoft has new simulation-based product lines and has integrated the Books24x7 reference assets into their content catalog.

The most unique (and aggressive) pure-plays will survive as best-of-breed *integrated* solutions. Web Services is one of the latest innovations in enterprise application integration technology. Element K and VCampus are the first two elearning companies to upgrade their platforms with Web Services.

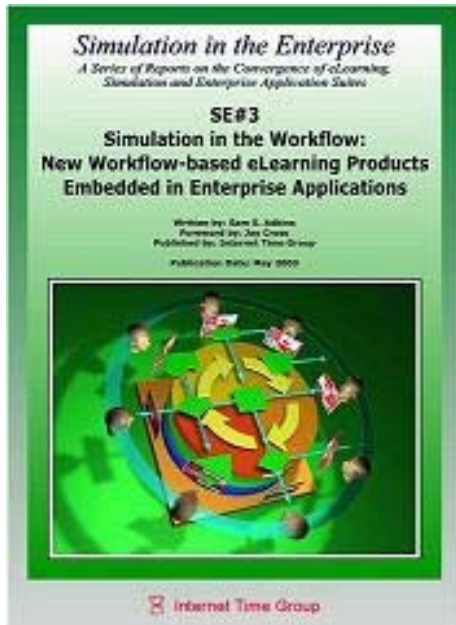
Docent, Saba and Hyperwave have integrated analytics and business process management into their suites. THINQ has begun to educate customers on the benefits of enterprise application integration. These tactical maneuvers are efforts to achieve best-of-breed status and will help all these vendors position their solutions as "integration-friendly" platforms.

Customers are steadily migrating away from courseware-based elearning products and enthusiastically adopting next-generation, real-time, embedded workflow products. Even at the height of the recession, vendors of these new products experienced unprecedented revenue growth.

Best-of-breed vendors will need to develop performance-based products and support extensive integration with workflow processes across the enterprise. They will need to migrate away from courseware-based product models. At all costs they must downplay the "point solution" status of their products. Topics covered in the second report include:

- Web Services and eLearning
- The Emergence of Workflow
- The Assimilation of Elearning into Enterprise Point Solutions
- The Assimilation of Elearning into Integrated eBusiness Suites
- The Impact on the eLearning Industry
- The Emergence of Best-of-Breed Workflow Products
- Systems Thinking and Situated Learning: Workflow Trumps Courseware

## Simulation in the Workflow: New Workflow-based eLearning Products Embedded in Enterprise Applications



The third report describes the impact that this application convergence and assimilation is having on corporate performance improvement methods and technology. Simulation is currently the most advanced learning technology but there are many more innovations appearing in the enterprise.

The single most salient characteristic of next-generation learning technology is Workflow-based eLearning and collaboration. Workflow and contextual collaboration happen to be the most prominent characteristic of the product enhancements to next-generation collaboration, product lifecycle and business process management products.

Workflow-based eLearning and collaboration in the form of simulation is being accessed in the context of the workflow and the workflow is being experienced in the context of a simulated workspace.

Vendors from several previously distinct industries are marketing products that use simulation, workflow and collaboration to improve human performance. Content

management vendors are buying collaboration companies and enterprise vendors are integrating performance support, simulation and virtual classrooms into their product suites.

Simulations in the products from these vendors are used for interactive manuals, business process demonstrations and coaching inside applications. They are also used for creating virtual workers and even environments for extended enterprise collaboration in what is now called WorkSpace (what the military calls BattleSpace).

In this report the eight primary patterns of innovation are described. Workflow-based eLearning is defined and new Workforce Analytics technologies are discussed. The Continuous Workflow Performance Improvement framework is introduced along with the new Real-time Extended Enterprise Taxonomy.

In the context of integrated and highly dynamic convergent systems and composite applications, a convergent type of continuous performance improvement framework is needed.

The Continuous Workflow Performance Improvement (CWPI) Framework is designed to model, manage, measure and modify performance. The Real-time Extended Enterprises Taxonomy is designed to map the corporate technical assets that can be used in the CWPI process. The following chart shows the correspondences with other well-known continuous performance improvement frameworks.

Wireless technology is being used to extend the enterprise beyond BackOffice and FrontOffice 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. Topics covered in the third report include:

- The Foundation of Workflow-based eLearning and Continuous Workflow Performance Improvement
- Workflow-based eLearning Defined
- Workflow-based eLearning and the Bottom Line
- Workflow as the Carrier Wave of Learning

- The Extent of Workflow in the Virtual WorkSpace: Mobile-ware, Everywhere
- The Real-time Extended Enterprise Taxonomy
- Modeling Performance in the Workflow
- Business Process Management and Workflow Principles in Workflow-based eLearning
- Managing Performance in the Workflow
- Measuring and Tracking Performance in the Workflow
- Modifying Performance in the Workflow

## Pioneers of Innovation 2003: Advanced Learning Technology in the Enterprise Today

The fourth report highlights the completely new innovations that are emerging out of several new technology categories. They are the result of the quest to achieve the Real-time Extended Enterprise.

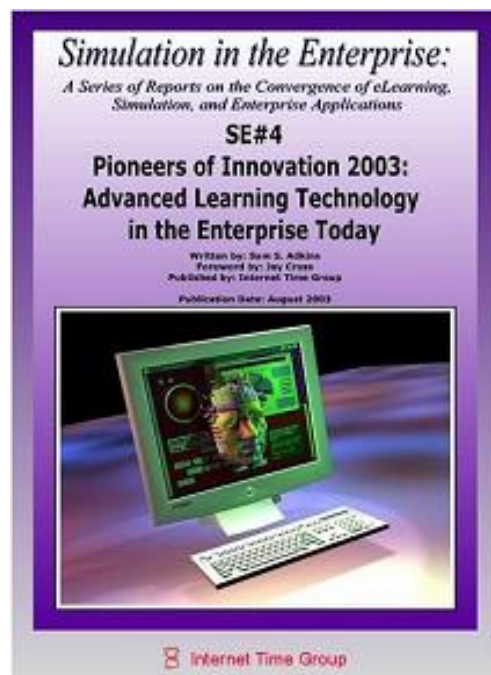
They have a direct impact on performance improvement but are completely different from conventional approaches to elearning or performance support.

Workflow-based eLearning, Workforce Analytics, Web Services and a range of new innovations derived from structured knowledge management and expertise mining are highlighted in this section. Extraordinary products from pioneers of innovation are all highlighted in stand-alone profiles.

The final report highlights advanced learning technologies emerging from the Real-time Extended Enterprise and identifies the top pioneers of innovation.

They have a direct impact on performance improvement but are completely different from conventional approaches to elearning or performance support. Intelligent graphics, interactive technical manuals, and new innovations derived from complexity theory are highlighted in this section. Extraordinary innovations in automated content categorization and automated content generation are described in this section.

Vendors highlighted as pioneers of innovation in the fourth report include: IBM, Sun, Oracle, SAP, Siebel, Microsoft, PeopleSoft, Knowledge Impact, Nobilis, VCampus, Element K, Teemplate, Ultimus, Lombardi, XStream, Knowledge Products, and Hyperwave.



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