# A REVOLUTION IN
# KNOWLEDGE
# SHARING
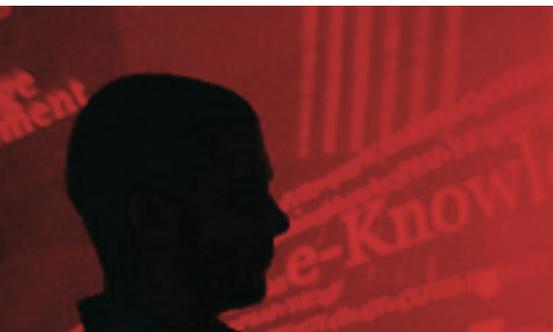
By Donald M. Norris,
Jon Mason, Robby Robson,
Paul Lefrere,
and Geoff Collier

The pressure to transform our institutions of learning continues. Virtually every enterprise and institution is grappling with the disruptions and opportunities caused by Web-enabled infrastructures and practices. New best practices, business models, innovations, and strategies are emerging, including new ways to acquire, assimilate, and share knowledge. Using technologies that are already developed or that will be deployed over the next five years, best practices in knowledge sharing not only are diffusing rapidly but will be substantially reinvented in all settings: educational institutions, corporations, government organizations, associations, and nonprofits. But institutions of learning are in a unique position to benefit from an added opportunity: providing leadership in e-knowledge.

Donald M. Norris is President, Strategic Initiatives, Inc. Jon Mason is Executive Consultant, education.au limited, and Assistant Director, Educational Technology Standards Australia. Robby Robson is President and Senior Partner, Eduworks Corporation, and chair of the IEEE Learning Technology Standards Committee. Paul Lefrere is Executive Director E-learning, Microsoft EMEA, and Professor of E-learning, University of Tampere, Finland. Geoff Collier is CFO and Senior Partner, Eduworks Corporation.

*E-knowledge* finds expression in many shapes and forms in a profoundly networked world. It is not just a digitized collection of knowledge. E-knowledge consists of knowledge objects and knowledge flows that combine content, context, and insights on application. E-knowledge also emerges from interactivity within and among communities of practice and from all kinds. They will support a "Knowledge Economy" based on creating, distributing, and adding value to knowledge, the very activities in which colleges and universities are engaged. Yet few colleges and universities have taken sufficient account of the need to use their knowledge assets to achieve strategic differentiation.

In "IT Doesn't Matter," a recent article in *Harvard Business Review*, Nicholas G. Carr endorsed corporate leaders' growing view that information technology offers only limited potential for strategic differentiation.[1] Similar points are starting to be made about e-learning, and knowledge management has been under fire as ineffectual for some time. The truth is that IT, e-learning, and knowledge management can provide strategic differentiation only if they drive genuine

professional guilds. True, there has always been academic collaboration, but there is little *systematic sharing* of learning content, context, and supporting materials. When asked about it, many faculty respond, "Why would I want to share course materials and content with anyone?" Similarly, knowledge generated by research activities often stays within a laboratory or research team and rarely crosses disciplinary boundaries. In most academic settings, knowledge resides in archipelagos of individual knowledge clusters, unavailable for systematic sharing. Yet such defiance of the networked world will soon be unsustainable.

It is the challenge of institutional leadership to get faculty and staff to reflect on the nature of knowledge and on how knowledge can be understood and shared

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the troves of tacit knowledge and tradecraft that can be understood only through conversations with knowledgeable practitioners. *E-knowing* is the act of achieving understanding by interacting with individuals, communities of practice, and knowledge in a networked world. *E-knowledge commerce* consists of the transactions based on the sharing of knowledge. These transactions can involve the exchange of digital content/context and/or tacit knowledge through interactivity. Transactable e-knowledge can be exchanged for free or for fee. E-knowledge is enabling not only the emergence of new best practices but also the reinvention of the fundamental business models and strategies that exist for e-learning and knowledge management.

E-knowledge is technologically realized by the fusion of e-learning and knowledge management and through the networking of knowledge workers. Transactable e-knowledge and knowledge networking will become the lifeblood of knowledge sharing. They will create a vibrant market for e-knowledge commerce and will stimulate dramatic changes in the knowledge ecologies of enterprises of

innovation and business practice changes that yield greater value for learners. Carr's article provoked a host of contrary responses, including a letter from John Seely Brown and John Hagel III. Brown is well-known for his insights into the ways in which knowledge sharing can provide organizations with a solid basis for strategic differentiation.[2] In this article, we argue that knowledge sharing—if it sparks innovation, changes in organizational dynamics, and new sources of value—can also make the difference in academia and e-learning.[3]

## Reflecting on the Nature of Knowledge

It is remarkable how unreflective many academics and educators are about the nature of knowledge, outside of their immediate domains of interest. To be sure, they hold some types of knowledge in high regard, and they respect the highly personalized knowledge that academics and practicing professionals have accumulated. But academic knowledge substantially remains a "cottage industry," with both tacit and explicit knowledge the purview of isolated craftspeople and

in different ways. Knowledge can be modeled as a "thing" and a "flow" at the same time. It is a static resource—a snapshot, if you will—and a dynamic flow between the various states of the known and the unknown. Knowledge flows between tacit (subjective) and explicit (objective) states; it often exists in transition between the two; and it also exists in symbiosis, combining these two dimensions. However, much of the classic knowledge management literature, in identifying these two dimensions, still tends to treat knowledge more as a thing (knowledge-as-resource). Current thinking places greater emphasis on the emergent quality of knowledge, as it is realized through practice and knowledge networking.[4]

There is no simple, linear hierarchy and progression from data to information to knowledge. In reality, there is a complex intermeshing, such as a continuous churning of insight, the meaning of which changes in different contexts and through conversations with different participants. That's not to say we don't need to model and understand the distinctions between data, information, and knowledge. Information is data that has been organized in

such a way that it achieves meaning in a generalized way. Knowledge is information presented within a particular context, yielding insight on application in that context. But the progression from one to another is continuous rather than intermittent and discrete. As Thomas Davenport and Sirkka Jarvenpaa note, "Our distinction between data/ information and knowledge conveys that the source of value does not arise from possessing the information source, but from acting on it in a context of a specific meaning at a specific time."[5]

Brown and many before him have argued that knowledge is a social construct. People can understand information individually and in isolation. However, knowledge—even the abstractions of mathematics—can be understood only in context, which means through interactivity and communication with others. Interactivity and knowledge sharing not only are integral to "knowing" but are essential for continually evolving knowledge to new plateaus of meaning. As Alfred Beerli asserts, "Knowledge can be regarded as the only unique resource that grows when shared, transferred, and managed skillfully."[6]

People experience and act on knowledge in a host of different ways. When preparing our book *Transforming e-Knowledge,* we referred to the "acquisition, assimilation, and sharing of knowledge." This was a code for the range of knowledge skills that are needed to succeed in the Knowledge Economy. But in practice, knowledge use is much more complicated than that and includes interpreting, reflecting, creating, applying, realizing, understanding, associating, recognizing, repurposing, and enhancing knowledge.

In a pervasively networked world, individuals are part of intersecting networks of interest and communities of practice. Knowledge becomes tangible as digitized content, as context that can be digitally shared, and through direct and indirect interactions. Knowledge can be created by asking a question and watching the responses provoke cascading conversations, responses, and interactions among network participants. The networked world continuously refines, reinvents, and reinterprets knowledge, often in an autonomic manner.

It is revealing to view knowledge through the different lenses of "know what," "know who," "know how," "know why," "know where," "know when," and "know if":

- **Know What:** knowledge management, knowledge management systems, information structure, semantics, e-learning
- **Know Who:** networks, authorities, individuals, practitioners, collaboration
- **Know How:** networking, consulting, collaborating, sharing, researching, reflecting, developing, testing, maintaining, doing, learning, educating, training, innovating, managing, navigating
- **Know Why:** context, business planning, strategy, reasons to learn
- **Know Where:** where-to, where-from, strategic positioning, planning, reflecting
- **Know When:** timing, pacing, planning, scheduling, context, just-in-time
- **Know If:** scenarios, scenario development, foresight, contingency, just-in-case

Much of our traditional, explicit knowledge deals with "know what," though training has expressed this more often as "know how." But most Knowledge Economy enterprises are focusing more attention on tacit knowledge and insights revealed through interaction, collaboration, and innovation. Much of this tacit knowledge exists and is communicated through conversations in communities of practice or networks of practice. Such "know how," "know who," "know where" knowledge promises to be increasingly important. The knowledge networks and communities of practice that specialize in such tacit knowledge will most certainly be the epicenters of the Knowledge Economy.

Higher education should consider these lenses as it debates the scope of knowledge needed to support learning and practice. Reflecting on the nature and facets of knowledge initiates a progression from the question "How have I come to know X?" to "How do I share X?" Answering these questions constitutes taking steps toward understanding the role of transactable e-knowledge and knowledge networks in knowledge sharing.

## Understanding the Role of Transactable E-Knowledge and Knowledge Networks

From the start, we have understood the importance of interoperability as a principle that is fundamental to networking and the development of learning object and knowledge object marketplaces. Interoperability is also key to shared understanding. From a systems perspective, four points of enterprise interoperability are needed for colleges and universities to share knowledge objects and networked knowledge:

- **Description, discovery, and exchange of content:** Content must be described and accessed in standardized and interoperable ways.
- **Interaction with and tracking of content:** When users interact with content—for example, when they take a course, complete a quiz, or annotate an article—the results must be tracked in ways that are independent of the technology platform being used.
- **Applications system interoperability:** Technologies used for e-knowledge must have standardized interfaces to enterprise systems such as human resources and registrar systems.
- **Infrastructure interoperability:** Technologies used for e-knowledge must use industry-standard methods to interface with institutional IT infrastructures and with each other.

Observing emergent knowledge practices has led us to rethink the nature of learning and its supporting knowledge base. Learning and the development and use of knowledge are not separable, standalone activities. In the networked world, perpetual processes of learning are supported by vast, accessible, continuously changing resources of explicit and tacit knowledge. E-learning and knowledge management become fused in practice. Both are essential to everyone in an educational institution, not just to specialists or technologists. Moreover, their fusion remedies the inefficiencies of institutional silos.

In higher education today, pioneering efforts are under way to capture digital assets in shareable knowledge objects. Our

**Table 1.** E-Knowledge: Today and Tomorrow

| TODAY:<br>Proof-of-Concept of<br>Transactable E-Knowledge | TOMORROW:<br>Developing<br>E-Knowledge Commerce |
|---|---|
| ● Learning objects capture content and context but are largely distinct from developing knowledge networks. | ● Knowledge objects capture content and context independently, plus notes and automated updates, and will align closely with knowledge networks. |
| ● Learning objects are oriented toward explicit knowledge. | ● Knowledge objects and access to knowledge networks provide channels to both explicit and tacit knowledge. |
| ● Early-stage standards focused on data exchanged among systems. | ● Standards, tools, and processes are substantially more sophisticated, pragmatic, and useful. Standards focus on information, not just data. |
| ● Knowledge networks and communities of practice are inadequately recognized in organizations. | ● Knowledge networks and communities of practice are the epicenters of tacit knowledge creation and sharing. |
| ● E-learning and knowledge management resources evolve independently and begin to intersect. | ● E-knowledge resources and networks are dynamic and churning. |
| ● Learning objects are relatively expensive to capture, create, and update. Learning objects are handcrafted. | ● Automated capture and update protocols create knowledge objects that are substantially less expensive (order of magnitude). Knowledge objects are generated autonomically. |
| ● Learning objects are drawn from traditional sources of academic content. | ● Knowledge objects and conversation-born tacit knowledge are assembled from a wide range of sources, ranging from traditional sources to individual blogs and communities of practice. |
| ● Enterprise routines are not yet established for creating, updating, and repurposing learning objects. | ● Enterprise processes for accessing knowledge networks and for knowledge object creation, updating, and repurposing are routinized and have achieved amenity. |
| ● Digital rights management is about enforcing copyrights and licenses, thus protecting ownership and "building a moat" around intellectual property. | ● Digital rights management is about enabling people to both share knowledge and share its control. |

perspective on the potential of these knowledge objects is detailed in "Share and Share Alike: The Knowledge Transformation Comes to Campus."[7] Today's transactable e-knowledge tools and practices are essentially proof-of-concept efforts. They are a first step, not an accurate harbinger of things to come. Three to five years from now, genuine e-knowledge commerce will be developing. The nature of tomorrow's knowledge objects and institutional practices will likely not resemble today's first generation of learning objects (see Table 1).

Today's proof-of-concept efforts will enable the development of more robust perspectives, tools, policies, and practices. At the same time, new deployments of pervasive, ambient technology are likely to accelerate and shape the future of e-knowledge.

**Changing the Knowledge Experience**

The development of wireless communications is enabling technology-rich environments in which individuals can carry networked digital devices like notebook computers, PDAs, cellular phones, pagers, and a myriad of converging tools that open new opportunities for communication and knowledge sharing. Moreover, *pervasive computing* is creating environments in which ubiquitous computing devices are being embedded in everything from automobiles to offices to clothing to appliances to whiteboards and other displays. Coupled with emerging voice-recognition and display technologies, these developments have the potential to turn every kind of public and private space into a venue for digitally enabled knowledge sharing and learning.

Our team examined forecasts and future scenarios prepared by technology futurists in Europe, North America, and Australia.[8] These projections suggest that by 2010, the patterns of interactivity and the very manner in which we experience knowledge will be enriched. At an accelerated, turbulent pace, everything about the knowledge experience will change, including the places in which we can experience knowledge, the intensity of our engagement with knowledge sources, the time sequence for accessing knowledge, our expectations about knowledge timeliness, our reliance on intelligent

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agents, our ability to multitask knowledge streams, and the *amenity* of the knowledge experience. These changes will accelerate the demand for e-knowledge and for reliance on knowledge networks in a variety of forms and formats. They will further boost the demand for e-knowledge commerce of many kinds.

Examples of such smart environments can be seen today at Xerox's PARC, at numerous corporate and academic sites, and in various demonstration settings. The movie *Minority Report* provided a stunning dramatization of how individuals in the mid-twenty-first century may be able to use pervasive knowledge environments to engage and manipulate a virtual avalanche of information and knowledge in pictorial, text, graphical, and audio forms. Most of the technologies necessary to implement such capabilities already exist or are under development.

When pervasive knowledge sharing and perpetual learning do achieve amenity, they will become a fully integrated aspect of daily life. They will be absorbed into our day-to-day routine. Educators and practitioners need to be more reflective about the development

of pervasive, ambient technology environments and what these will mean for the experiences of learners, faculty, staff, and other stakeholders, both on and off campus. How will such environments affect the construction of new facilities? The retrofitting of existing facilities? Campus master planning? The relationship between campus environs and other settings?

These developments will both enable and require colleges and universities to change their basic *knowledge ecologies* if they are to remain attractive to learners. These transformations will include not just infrastructures for interactivity and knowledge sharing but also the basic processes, structures, competencies, and cultural beliefs and practices relating to the use and sharing of knowledge. Our team concluded that evolving a knowledge ecology poised for success in the Knowledge Economy is among the greatest challenges confronting institutional leadership.

### Transforming the Knowledge Ecology

Over the past decade, higher education institutions have undertaken major in-

vestments in their capabilities for processing knowledge through deploying enterprise resource planning (ERP) systems, enterprise portals, data warehousing, course management systems, learning management systems, and some content/knowledge management tools. In "The Afterlives of Courses on the Network: Information Management Issues for Learning Management Systems," Clifford Lynch captures how learning management systems are forcing institutional leaders and technology vendors to confront some of the issues relating to the afterlife of knowledge assets contained in courses.[9]

But there is more to knowledge resources than courses. Digital asset management is receiving attention from many institutions, encompassing the full range of institutional knowledge assets in learning, research, practice, and public service. Leading institutions are creating infrastructure for knowledge repositories and/or "superarchives" (e.g., Ohio State University's Knowledge Bank, MIT's DSpace, the Fedora Project, and the University of California system's Scholarship Repository). Cross-enterprise efforts are

popping up all over the world (e.g., MER-LOT, the Learning Objects Network, The Le@rning Federation in Australia, and eUniversity in the United Kingdom). Initiatives such as the Open Knowledge Initiative (OKI) and MIT's OpenCourse-Ware (OCW) are tapping into latent support for an open-source approach to e-knowledge and e-learning and the sharing of knowledge assets. Taken together, these approaches herald the development of genuine marketplaces for e-content and context and knowledge networks, supporting the exchange of e-knowledge, sometimes for free and sometimes for fee.

Most institutions have been tinkering with aspects of their knowledge ecosystem, not truly transforming their capacity to share knowledge. Knowledge is still primarily embedded in individual faculty and researchers, texts and course materials, and traditional publications and journals. Faculty, learners, staff, and practitioners do not substantially utilize the potential of knowledge networks and communities of practice to interact. Over time, e-knowledge can change all this. It will do more than merely improve the efficiency of the existing channels and interactions for knowledge sharing. E-knowledge enables the unbundling, deconstruction, and reinvention of *all* of the knowledge elements and patterns of interactivity associated with learning, research, and other institutional functions. The capacity to deploy e-knowledge will be accelerated over the next few years by new enterprise infrastructures, portals, Web services, new kinds of knowledge management applications, and community-building technologies. Both academic and administrative processes will be loosely coupled and deconstructed. New technologies and practices will support the emergence of a seamless web of interoperable applications for dealing with knowledge and knowledge-based interactivity.

The new knowledge-sharing ecology will ground itself in collaboration, communities of practice, and knowledge networks. These are starting to emerge in the form of user groups for major ERP and learning management systems, implementation teams for campus technology projects, institutional working groups in administrative and academic support areas, and special-interest groups in professional societies. Multi-institutional consortia also are part of the equation. The Boston Consortium, a group of thirteen institutions in the Boston area, involves over four hundred administrative staff in nearly twenty working groups that define and solve issues using a community of practice model. Soon these nascent knowledge networks can be equipped with the next generation of tools, perspectives, and practices for knowledge sharing. When that happens, their performance will be poised to increase dramatically.

Our team studied examples of institutions and enterprises that are building tomorrow's knowledge cultures based on "enter once, use (and trust) anywhere" principles for knowledge reuse and with the goal of dramatically reducing the costs of digital knowledge. A few examples of emerging or prospective e-knowledge cultures can be found at the University of Southern Queensland in Australia, eUniversity in the United Kingdom, and the American Society for Training and Development (ASTD) and the Advanced Distributed Learning (ADL) initiative's co-labs in the United States. Companies like Knowledge Media Inc. (KMI) are utilizing automated tagging and knowledge-object creation, in conjunction with activity-based costing, to drive down the cost of digital knowledge.

Where does value reside in colleges and universities? It is waiting to be released in the interstitial spaces between processes, programs, and people. In the Knowledge Economy, enterprises are finding new ways to release value through leveraging knowledge, reinventing process, collaboration, and community building, and developing staff capabilities and new kinds of leadership. Leading-edge practitioners are demonstrating that

the key to establishing competitive advantage lies in changing their organizational dynamics in a way that creates greater value for customers, members, learners, and other stakeholders.

Our team used the concept of *value on investment* to explore the implications of knowledge sharing for institutional competitive advantage.[10] To be sure, there is value in enhancing productivity of existing practices by using knowledge sharing to share text, course-pack materials, class can also access a wider range of resources—from standard searchable course repositories to question/answer capabilities to interactivity with other students, with question/answer resources, and with individual members of a faculty team.

Equally profound, changes in organizational dynamics and the knowledge ecology can reshape the basic relationship between learning providers and learners. Consider the example of NextEd and other learning enterprises attempting to serve the emerging learning market in Asia. NextEd is brokering offerings from learning providers, using its on-the-ground relationships maintained through learning centers across China. With this model, lower-cost solutions are being found that can eventually spread to markets in Europe and the Americas.

These examples only hint at the potential for changes in the learning experience. When a vibrant marketplace of knowledge networks and e-knowledge exists, providing immediate access to continuously updated knowledge as an expected amenity, learners will demand learning experiences and supporting resources to be engaging, interactive, participatory, and immediate. The dynamics of graduate and professional education and the continuing, perpetual development of professionals will likely include more and more cascading conversations, group problem-solving, and synthesis of new practice. These will be supported by continuously changing collections of fresh insight. For example, the Urban Land Institute has prototyped a model for practitioner-driven problem-solving that

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notes, and other existing collections of course-support materials. Doing so trims costs and may result in a better, more current selection of materials. It may improve the learner's experience. But the real payoffs come from reinventing the processes and patterns of interactivity relating to learning. We found new best practices, business models, and strategies for learning and knowledge management emerging around the globe. All used innovation to enhance their value proposition.

The University of Southern Queensland, for example, has infused its course offerings with knowledge management capabilities and has reshaped the patterns of interactivity in its courses. Students can dial up and ask Professor Jones a question, to which they will receive an answer that is a nuanced synthesis of the best answers to similar questions in the recent past—with no indication that "Professor Jones" is an intelligent agent. This frees faculty to deal with course design and assessment of student progress, higher-level interactivity relating to critical tacit knowledge, and other activities. Learners

Consider also the Creative Commons (http://www.creativecommons.org), a movement that facilitates the sharing of knowledge by allowing authors to license their works in ways that do not prevent intended uses (such as free distribution for noncommercial means) while protecting authors from unintended abuses (such as unsanctioned alterations).

Knowledge sharing can enable knowledge producers to reach markets that have not been served in the past. For example, as is being done by the American Association of Pharmaceutical Scientists and the American Health Information Management Association, knowledge objects from professional societies and associations and professional practice repositories can be made available to colleges and universities and to corporate markets for inclusion in learning and training experiences. Conversely, colleges and universities engaged in e-learning programs are increasingly repurposing existing materials for use by remote learners and for sale to the corporate world.

will revolutionize the way urban land development is taught in graduate school and in practice. Even undergraduate education and introductory baccalaureate courses need to acquire a different look and feel. In a world of ambient technologies, pervasive knowledge networking, and multitasking learners, the dynamics of learning experiences must change to provide value to new generations of learners.

### Defining a New Taxonomy of Knowledge Repositories and Resources

Knowledge sharing is a new frontier on campus. Consider the range of repositories and resources that are emerging, which we term "vertical" to mean that a collection is in a particular discipline or

practice area and "horizontal" to mean that it covers a range of disciplines or types of knowledge. Some of the following collections exist today, and others are poised to emerge.

- *Institutional repositories* capture the knowledge that lies within a particular community, such as a college or university, and that crosses over many professional and discipline-based communities of practice. Such repositories are *local and horizontal.* (Examples are Ohio State University's Knowledge Bank and the University of California system's Scholarship Repository.)
- *International, disciplinary repositories,* such as the Digital Library for Earth System Education (DLESE), are digital libraries that serve an international, discipline-based community of practice. These are *international and vertical.*
- *Tradebook and academic publishers* capture knowledge from texts in digital form and can combine this knowledge with other intellectual property within their digital library. These silos are *commercial, international, and horizontal.* A good example is Emerald (http://www.emeraldinsight.com), the leading publisher of academic and professional literature in the fields of management and library/information management.
- *Learning management systems* include digitized course content from faculty materials on platforms such as Blackboard and WebCT. These collections of digitized content are *international and horizontal.*
- *Academic content exchanges* such as MERLOT collect course materials, including validated peer reviews of the materials. These are *global and horizontal.*
- *Communities of practice* exist throughout academia, in academic and administrative support areas like enrollment services and human resources. Groups such as The Boston Consortium have formalized their communities of practice and over time will digitize the formal and informal resources supporting the community. These are *local and vertical.*
- *Individual weblogs (blogs) and knowledge weblogs (klogs)* are created by individuals

in communities of practice. As the power of communities of practice grows, the contributions of individual members through blogs will be formally recognized as an important knowledge asset. An exemplar blog is published by Stephen Downes (http://www.downes.ca).

The basic issue is to evolve an architecture that enables this whole family of repositories, assets, proprietary holdings, and blogs/klogs to be intelligible to one another and that enables transactions under rules and protocols appropriate to the particular setting. This will require persistent, dynamic digital rights management.

In addition, there is a need for exchanges that will aggregate supply and demand for digital content/context from a wide variety of sources and create sorts of *über-marketplaces.* These efforts could introduce protocols that would become de facto standards and greatly reduce the cost and energy required to launch widespread knowledge sharing. In *Transform-*

*ing e-Knowledge,* we created a vignette about an e-knowledge marketplace called the "Knowledge Content Exchange." At the January 2003 meeting of the EDUCAUSE National Learning Infrastructure Initiative (NLII), Patrick McElroy presented information on the efforts of the Learning Content eXchange (LCX) to launch such an effort. LCX is marshaling corporate support and is developing its prototype in the higher education market. Another effort, eKnowledge-Xchange, is focusing on knowledge-sharing support and services for K–14, public libraries, and other sources of published materials. Other institutional and national repositories and exchange activities around the world are poised to grow and become part of a network of exchanges and *über-marketplaces.*

## Achieving a Revolution in Knowledge Sharing

In summary, leading-edge individuals and institutions are on the threshold of major advances in their capacity to acquire, assimilate, utilize, reflect on, and

share knowledge. Between now and 2010, the elements of e-knowledge, e-knowing, and e-knowledge commerce will mature, using technologies that are largely developed and that await deployment and widespread use. Academia will need to become far more reflective about knowledge—the forms, uses, and sharing—if it is to be a vanguard participant. The knowledge ecology of colleges and universities will need to change if they are to move from a culture of knowledge hoarding to one of knowledge sharing. In institutions where this happens, learners, faculty, staff, and other stakeholders will derive greater value from a set of genuinely new experiences.

In "Rethinking the Knowledge-Based Organization," Michael H. Zack asserts that the degree to which an enterprise is knowledge-based depends not on the nature of its programs, products, and services but primarily on how it is organized and how it functions.[11] True knowledge-based enterprises leverage their knowledge assets in every aspect of their activities, cultivate the process of knowledge

sharing and creation, extend knowledge boundaries beyond the enterprise, and develop effective knowledge strategy. Stephen Denning, Michel Pommier, and Lesley Schneier remind us that in the twenty-first-century economy, innovation and competitive positioning depend on shared knowledge. E-Knowledge can be both the instrument and the catalyst enabling colleges and universities to reorient their perspective on the power of knowledge sharing.[12]

The new sources of value unleashed by e-knowledge will not be planned and stamped out by major technology companies. Nor will they be ordained by international standards bodies and other groups developing standards and protocols for e-knowledge commerce. Instead, they will emerge in an expeditionary manner, based on the continuous evaluation and feedback of the marketplace as it discovers the potential of e-knowledge and responds to emerging prototype offerings. In order for the new sources of value to be tapped, the following elements must evolve:

- *Pragmatic, usable standards and tools to reflect practice.* In the absence of widespread practice, the standards emerging from international standards bodies have been based on *visions* of what e-knowledge commerce should be like. As prototype tools based on these standards are developed and deployed, users acquire experience. This experience must be used to modify the standards and tools, leading to standards that are pragmatic and stable. This is what practitioners need and want.
- *Low-cost knowledge management tools for every person.* Individual faculty, students, staff, and other college/university citizens need access to simple, low-cost, interoperable knowledge management tools so that they can create and manage content/context for personal use and sharing. These knowledge management tools should be multipurpose and not limited to the construct of the course or to any particular knowledge use. The knowledge and content management tools associated with the current software applications for higher education are not yet adequate to this task. The open-source movement continues to provide a challenge to the established vendors, and better tools are likely to emerge.
- *Low-cost approaches to knowledge-object creation, repurposing, and reuse.* Put simply, the cost of digital content/context needs to drop by an order of magnitude. Current handcrafted approaches to knowledge object creation need to be succeeded by automated practices. Given historical development in the price and performance characteristics of new technology-based innovation, such improvements are likely.
- *Capacity to liberate knowledge objects for exchange.* Many learning objects are developed within existing repository architectures or applications architectures that do not allow for comprehensive sharing. Learning management systems, enterprise portals, and knowledge management tools need to reexamine their architectures and

# Experience with real-life e-knowledge will lead to new iterations and to the discovery of new, unexpected migration paths.

approaches to ensure that they can be part of an adequate migration path for institutions seeking to unleash value through e-knowledge. The ADL co-labs are trying to change this and now host special events to showcase leading practice in sharable content (http://www.scodays.org).

- *Dynamic sharing tools and protocols to support knowledge networks and communities of practice.* How can communities of practice capture fresh insights for their members? And can they share insights with outsiders, for fee or for free, and under what protocols?

- *Exchanges that aggregate supply and demand and reduce the cost of exchange.* Some form or combination of *über-marketplaces* will likely be needed to provide the scale and low-cost practices necessary to "make the marketplace" for e-knowledge.

The bottom line? *Dare to share!*

Taken separately, e-learning, knowledge management, and IT have failed to provide strategic differentiation for colleges and universities. But by combining the three in higher education, e-knowledge can avoid suffering the same fate if it is used to change the dynamics of institutional business practices and to create new knowledge-based experiences, unleashing enhanced value. Brown and Hagel point out that such changes come from rapidly implemented, incremental innovations, using new, loosely coupled applications to continuously test, refine, and reinvent practices. Brown's phrase *radical incrementalism* captures the spirit of perpetual process reinvention, driven by transformative ambitions.

Ambitions *must* be transformative in higher education: they must revolutionize knowledge sharing and, in the process, substantially change the dynamics of higher education and enhance the value propositions provided by colleges and universities. Yet the process must be expeditionary, using prototype approaches that will be continuously adjusted. Loosely coupled, flexible architectures and applications will be developed to facilitate this process of adaptation. Experience with real-life e-knowledge will lead to new iterations and to the discovery of new, unexpected migration paths. Five to seven years from now, the e-knowledge standards, protocols, practices, and business models that have emerged will be very different from today's and from our own projections of what the future might become. E-knowledge is ready to be harnessed. Those who do harness it will be the differentiators. *e*

## Notes

1. Nicholas G. Carr, "IT Doesn't Matter," *Harvard Business Review*, May 2003.
2. John Seely Brown and John Hagel III, letter to the editor, *Harvard Business Review*, June 2003, available online at <http://harvardbusinessonline.hbsp.harvard.edu/b01/en/files/misc/Web_Letters.pdf;jsessionid=5U355YCSKTCVMCTEQENB5VQKMSARWIPS>. Brown and Hagel argue that strategic differentiation based on IT is grounded in three principles: (1) "extracting business value from IT requires innovations in business practices"; (2) "IT's economic impact comes from incremental innovations rather than 'big bang' initiatives"; and (3) "the strategic impact of IT investments comes from the cumulative effect of sustained initiatives to innovate business practices in the near term." For Brown's ideas on knowledge sharing, see John Seely Brown, "Rethinking Learning in the Digital Age of Change, Change, Change," European eLearning Conference, Edinburgh, Scotland, February 11, 2003, available for downloading at <http://www.elearninternational.co.uk/docs/presentations/speaker/johnseelybrown.zip> (accessed July 10, 2003).
3. Two years ago, an international team of practitioners, academics, and consultants assembled to focus on the issue of how individuals and organizations needed dramatically to enhance their capacity to acquire, assimilate, and share knowledge, given the constant pressure of disruptive change. A three-person writing team was supported by an advisory group drawn from leading authorities in standards, knowledge management, and e-learning movements in Australia, China, India, Japan, North America, Central America, and Europe: Judy Brown, United States; Dr. Richard Hames, Australia; Maria Teresa Martinez, Mexico; Professor Toshio Okamoto, Japan; Dr. Madanmohan Rao, India; Dr. Robby Robson, United States; Professor James C. Taylor, Australia; and Professor Zhu Zhiting, China. The work of this team was supported by sponsorship from SCT, WebCT, education.au, Knowledge Media Inc., and the MOBIlearn Project. The result, after fourteen months, was the following book: Donald Norris, Jon Mason, and Paul Lefrere, *Transforming e-Knowledge: A Revolution in the Sharing of Knowledge* (Ann Arbor, Mich.: Society for College and University Planning, 2003). See <http://www.transformingeknowledge.info/>. This article extends on the themes of the book, capturing our team's latest insights on e-knowledge.
4. Alfred J. Beerli, Svenja Falk, and Daniel Diemers, eds., *Knowledge Management and Networked Environments: Leveraging Intellectual Capital in Virtual Business Communities* (New York: AMACOM Books, 2003).
5. Thomas Davenport and Sirkka Jarvenpaa quoted in ibid., 43.
6. Beerli in ibid., 3.
7. Robby Robson, Donald M. Norris, Paul Lefrere, Geoff Collier, and Jon Mason, "Share and Share Alike: The E-Knowledge Transformation Comes to Campus," *EDUCAUSE Review* 38, no. 5 (September/October 2003), online version: <http://www.educause.edu/pub/er/erm03/erm035.asp>.
8. Norris, Mason, and Lefrere, *Transforming e-Knowledge*, 18–27, deals with the many aspects of the changing knowledge experience in words and pictures. See page 128 for resources on timeframes for ambient technology environments.
9. Clifford Lynch, "The Afterlives of Courses on the Network: Information Management Issues for Learning Management Systems," *ECAR Research Bulletin*, vol. 2002, no. 23 (November 26, 2002).
10. The notion of *value on investment* is more fully explored in two sources: Donald M. Norris, "Value on Investment in Higher Education," *ECAR Research Bulletin*, vol. 2003, no. 18 (September 2, 2003); and Donald M. Norris and Mark A. Olson, *The Business Value Web: Resourcing Business Processes and Solutions in Higher Education* (Washington, D.C.: NACUBO, July 2003).
11. Michael H. Zack, "Rethinking the Knowledge-Based Organization," *MIT Sloan Management Review* 44, no. 4 (summer 2003): 67–71.
12. Stephen Denning, Michel Pommier, and Lesley Schneier, "Are There Laws of Knowledge Management?" (February 14, 2002), paper presented at "Connecting the Future: Global Summit of Online Knowledge Networks," Adelaide, March 4–5, 2002, <http://www.educationau.edu.au/globalsummit/papers/denning.htm> (accessed July 21, 2003).