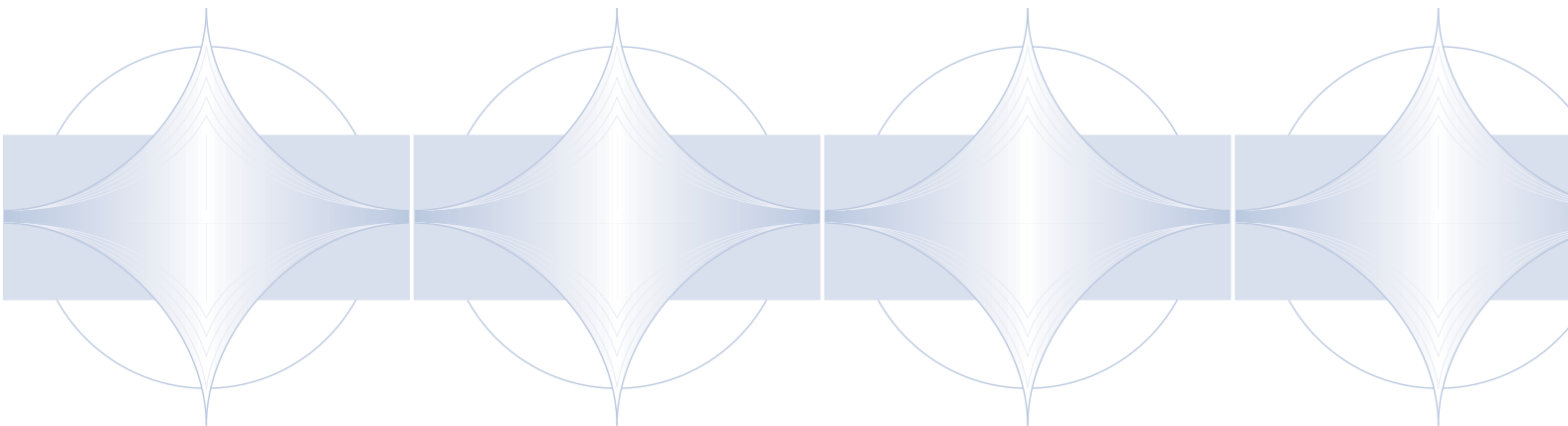


SCORM Implementation in eLearning

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EXECUTIVE SUMMARY

SCORM: Perspective and Status Report

SCORM, the sharable content object reference model for eLearning standards and specifications, has not found universal embrace—partly because some eLearning providers are concerned about loss of competitive advantage if they move away from their proprietary technology or because users are concerned about SCORM’s being too complex and constraining. Nevertheless, growing numbers of eLearning adopters or providers in both the United States and other countries are embracing SCORM—especially in the government sector, including in defense departments. Growing adoption is also taking place in both industry and academia—because no viable alternative exists for people recognizing the importance of interoperability and other benefits that SCORM brings.

In addition to describing SCORM adoption trends, including selected developments of interest in Europe and Asia, **SCORM: PERSPECTIVES AND STATUS REPORT** presents a brief primer of SCORM. It discusses and summarizes key elements of the SCORM model and provides context for the individual sections of the report.

Implementation Issues and Challenges

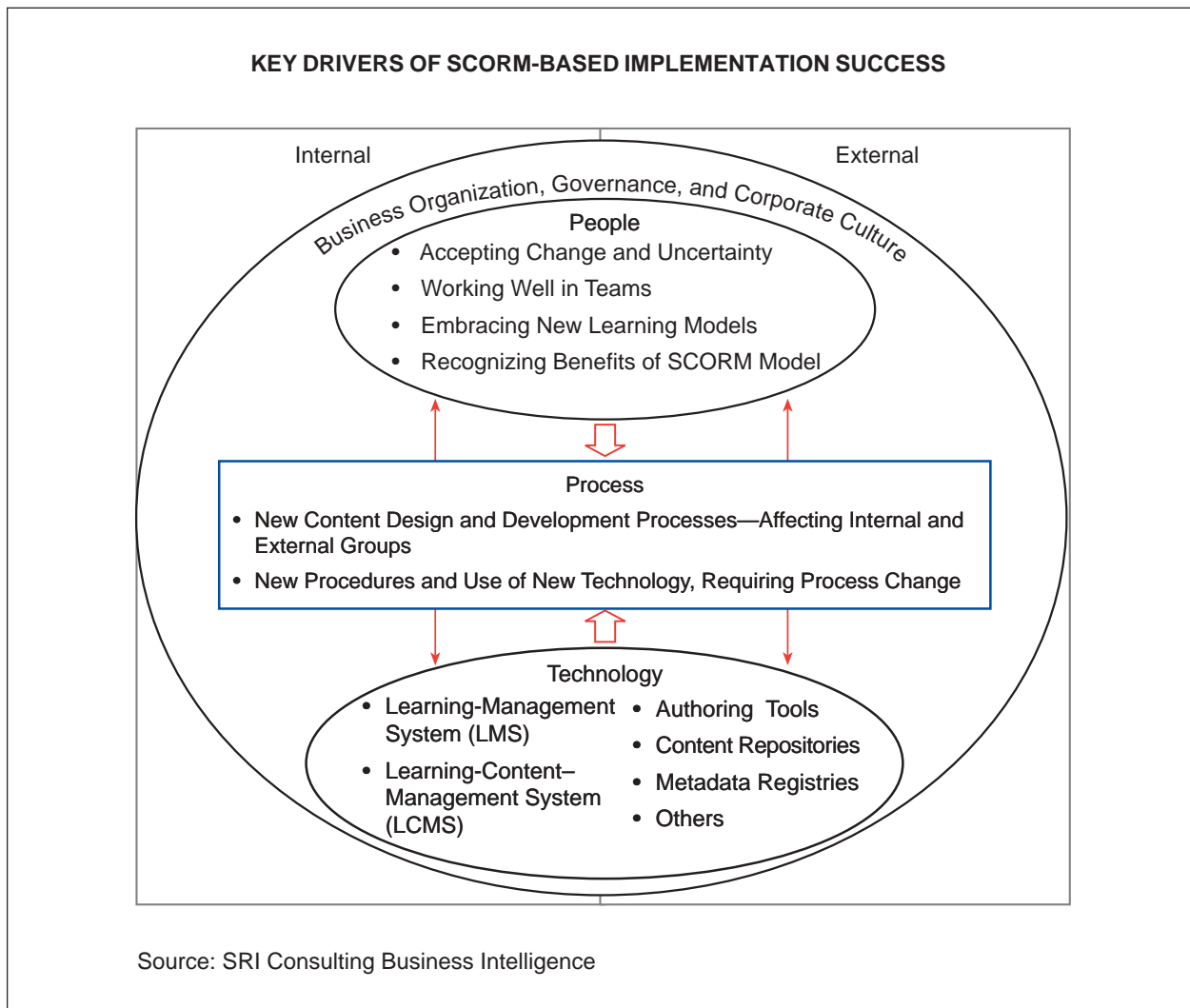
Key conclusions that we can draw from both the case studies in this report and from discussions that we have had with other organizations about major issues and challenges resulting from SCORM-based eLearning implementations fall primarily into the three areas in the figure on page 2—people, processes, and technology—within the context of organizational structures, culture, and governance. The degree to which these areas come together successfully—partly driven by effective communication and collaboration within and across work groups and teams that typically are part of a SCORM-based eLearning implementation as well as between these internal groups and external (vendor) organizations—will have a significant impact on how quickly and smoothly the implementation takes place.

Case Studies

Five organizations at different points on the eLearning and SCORM adoption curve have SCORM-based eLearning initiatives that illustrate the range of issues that organizations face and must address.

- *DaimlerChrysler Academy (DCA)*. DCA employs 225 people and is the largest (in terms of staffing) of the 15 training providers in DaimlerChrysler. DCA serves 4150 retail dealerships across the North American Free Trade Agreement (NAFTA) region and corporate field personnel. It developed its SCORM strategy in early 2003, and it decided, given SCORM’s interoperability and DCA’s unique learning needs, that DCA should have the key eLearning-platform components—learning-management system (LMS), learning-content-management system (LCMS), and authoring tool—from separate vendors. DCA put working teams and committees in place to coordinate and ensure the necessary collaboration and communication for successful deployment and

integration. It is now implementing the various elements and processes, and the targeted “go-live” date is March 2005.



- *The U.S. Internal Revenue Service (IRS)*. A learning and education community of approximately 800 serves the organization’s 120 000 employees. Key elements of its eLearning and SCORM strategy were in place starting in mid-2001. It has deployed a metadata registry and is now in the process of implementing an enterprisewide LMS and preparing to procure an enterprisewide LCMS. The IRS has made significant progress in learning object-based content strategy. Its longer-term vision is to use learning and knowledge objects as part of a broader enterprise vision of performance support and eventually to provide learning content for customers.
- *Eurocontrol (the European Organization for the Safety of Air Navigation)*. This organization exemplifies many smaller organizations in Europe where instructor-led training still dominates but where eLearning is gaining ground. It also represents a

corporate-university-like model or hub-and-spoke system, where Eurocontrol, as the hub, serves 33 member states with learning services. The organization consists of 2500 people, with 80 full-time employees in the training institute. Significant use of SCORM-based eLearning began in 2002 and is likely to continue to grow because Eurocontrol will likely serve its members with a growing number of eLearning courses in an application-service-provider role.

- *The International Virtual Medical School (IVIMEDS)*. This consortium of more than 40 medical schools from around the world is developing advanced eLearning solutions for medical and health care. It is committed to using learning objects and building virtual patients and virtual practices, and it will use both with curriculum maps and with the goal of assessing learning effectiveness in the context of learning outcomes. The proof-of-concept phase is complete, and IVIMEDS is now testing components of its learning environment—including the use of an LCMS and content repositories—and is in discussions with consortium partners about key strategic issues, including business model and intellectual-property rights. The initiative is innovative and very ambitious, so considerable challenges lie ahead.
- *MedBiquitous*. This consortium-based initiative complements what IVIMEDS is setting out to do. MedBiquitous has a more diversified membership of major professional medical societies, pharmaceuticals companies, universities, and others and will develop information technology and standards for medical education and publishing. The organization has been in operation since mid-2001 and has a number of working groups that are actively developing elements of its overall standards framework—leveraging work of other standards organizations. One element under development is the MEDBIQ-SCORM metadata specification.

The Future of SCORM

The report discusses future plans of the ADL Network for SCORM and some priority areas that will likely have attention—beyond SCORM 2004. Much of the work until now has focused on putting in place key pieces of the enabling-technology infrastructure—or what many people see as the “basic plumbing” for eLearning—but increasing attention will now address how to achieve effective and engaging online learning. Some of this attention will involve integration with other architectures and technologies. Greater focus on the learner and the learning experience and work to ensure the highest degree of learning effectiveness will become key priority areas of ADL.

Recommendations and Action Steps

The final section of the report suggests some key issues and questions that organizations considering SCORM-based eLearning-implementation initiatives should address. It also provides a simple decision framework to help an organization decide whether to embrace SCORM as part of its eLearning implementation. The section ends with some recommended action steps for eLearning providers to help them better meet customer needs and expectations in a world where adoption of SCORM is spreading and increasing.

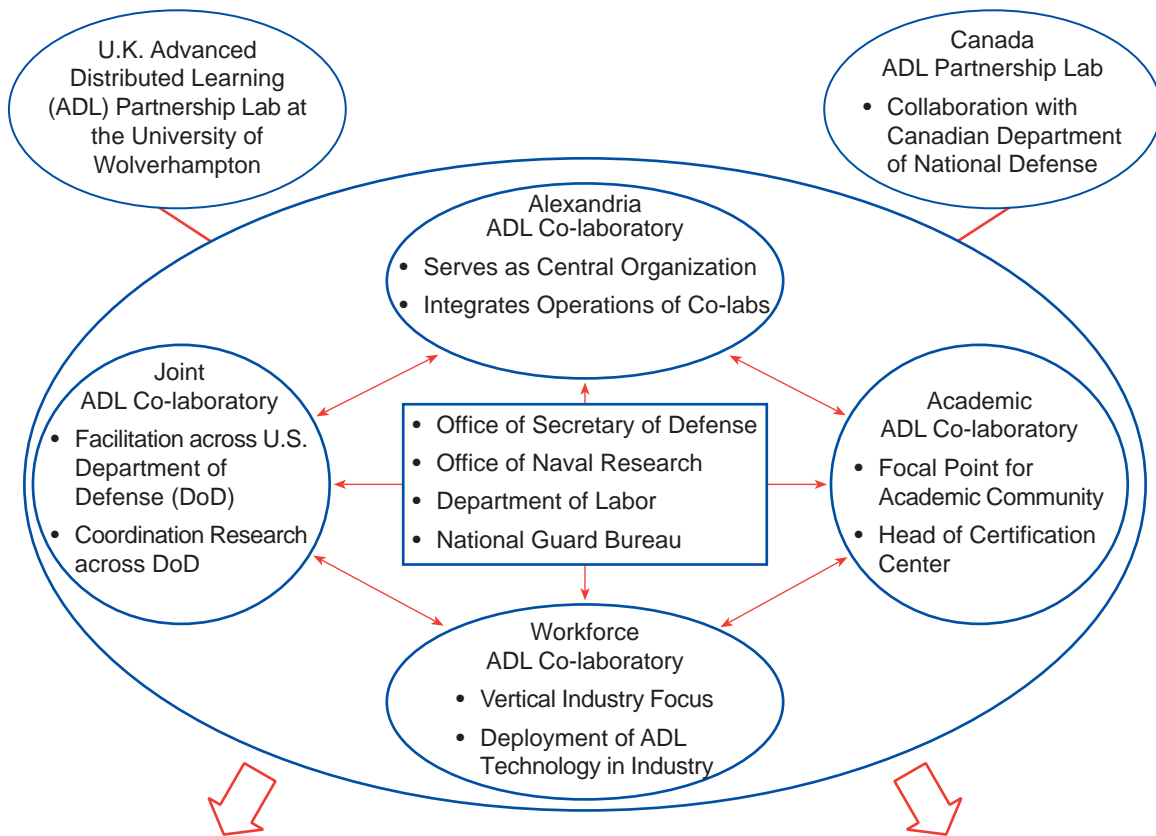
SCORM: PERSPECTIVE AND STATUS REPORT

Anyone who has attended eLearning conferences or who reads literature about learning technology has quickly realized that standards issues are an integral part of the eLearning field. Even if the proliferation of acronyms, technical terminology, and seemingly complex issues disinclines many people to engage in learning-technology standards, the reality is that the issues are here to stay and demand attention, sooner or later—even if not necessarily at the senior-management level.

Since early 1999—when an executive order tasked the U.S. Department of Defense (DoD) with facilitating collaboration between various DoD agencies and other government departments to develop common specifications and standards for learning technologies—the Advanced Distributed Learning Co-laboratory (ADL Co-lab) network and the reference model (sharable content object reference model, or SCORM) that it has developed have been focal points of work on learning-technology standards and specifications. Because DoD has the largest training operations in the world and has long been on the leading (and bleeding) edge of technology application for learning and training—including spending billions of dollars on games and simulations-based learning (see *Digital Game-Based Learning* by Marc Prensky for details about DoD programs and expenditures in this area)—the fact that DoD took the initiative and lead in developing learning-technology specifications and standards should be no surprise. No other single player was in a better and stronger position to take this leading role in driving technology-based learning toward greater use of open standards and enabling systems and content to interoperate.

As Figure 1 shows, a small number of key agencies took the lead in the ADL Co-lab development, and with time the ADL network has grown to four Co-labs (plus an ADL Technology Center in Pennsylvania) and two associated Co-labs in Canada and the United Kingdom, all working collaboratively with large numbers of partners in industry and academia and government. The ADL Network serves as a test bed for learning technologies and develops the reference model that builds on and leverages the work of other learning technology groups (for a discussion of such key groups as the Aviation Industry Computer-Based Training Committee [AICC], Advanced Learning Infrastructure Consortium [ALIC], and Instructional Management System [IMS] Global Learning Consortium, see *Making Sense of Learning Specifications & Standards* by The Masie Center).

**Figure 1
ADL NETWORK AND INITIATIVE**



Goal: Collaboration to promote tools, specifications, guidelines, policies, and prototypes that meet the following requirements:

- Accessible from multiple remote locations through the use of metadata and packaging standards
- Adaptable by tailoring instruction to individual and organizational needs
- Affordable by increasing learning efficiency and productivity while reducing time and costs
- Durable across revisions of operating systems and software
- Interoperable across multiple tools and platforms
- Reusable through the design, management, and distribution of tools and learning content across multiple applications

ADL Initiative will meet the goals above by providing leadership in the following core areas:

- Evolving specifications and guidelines for development and implementation of efficient, cost-effective, and global distributed learning
- Facilitating large-scale collaborative developments by organizations that share learning requirements
- Advancing the state of the art in the science and technology associated with individual and collective education, training, performance and assessment
- Providing global online forums that enable large-scale exchange of information, tools, and resources through ADLNet.org.

Source: ADL; SRI Consulting Business Intelligence (SRIC-BI)

ADL maintains a Web site with extensive information and resources about the work of the ADL Co-lab network and partners, including online forums on general SCORM topics (such as sequencing and navigation, tool development, and conformity), as well as topics such as third-party tools and instructional design. The Web site also provides searchable databases of SCORM adopters to enable organizations to find, for instance, authoring tools that are SCORM-conformant (currently they list 16 tools), SCORM-conformant content developers (27 listed vendors), or learning-management system/learning-content-management system (LMS/LCMS) products (70 currently listed vendors). ADL has also holds so-called Plugfests once or twice a year (it has held eight in the United States so far, and the first international Plugfest was in Zürich, Switzerland, in February 2004) to allow learning-technology companies and users to come together and share information and experiences (see <http://www.adlnet.org> for more information about the Plugfests, including proceedings from each one; also see the LoD Travel Report *ADL Plugfest 6 and the Relevance of SCORM*).

Brief SCORM Primer

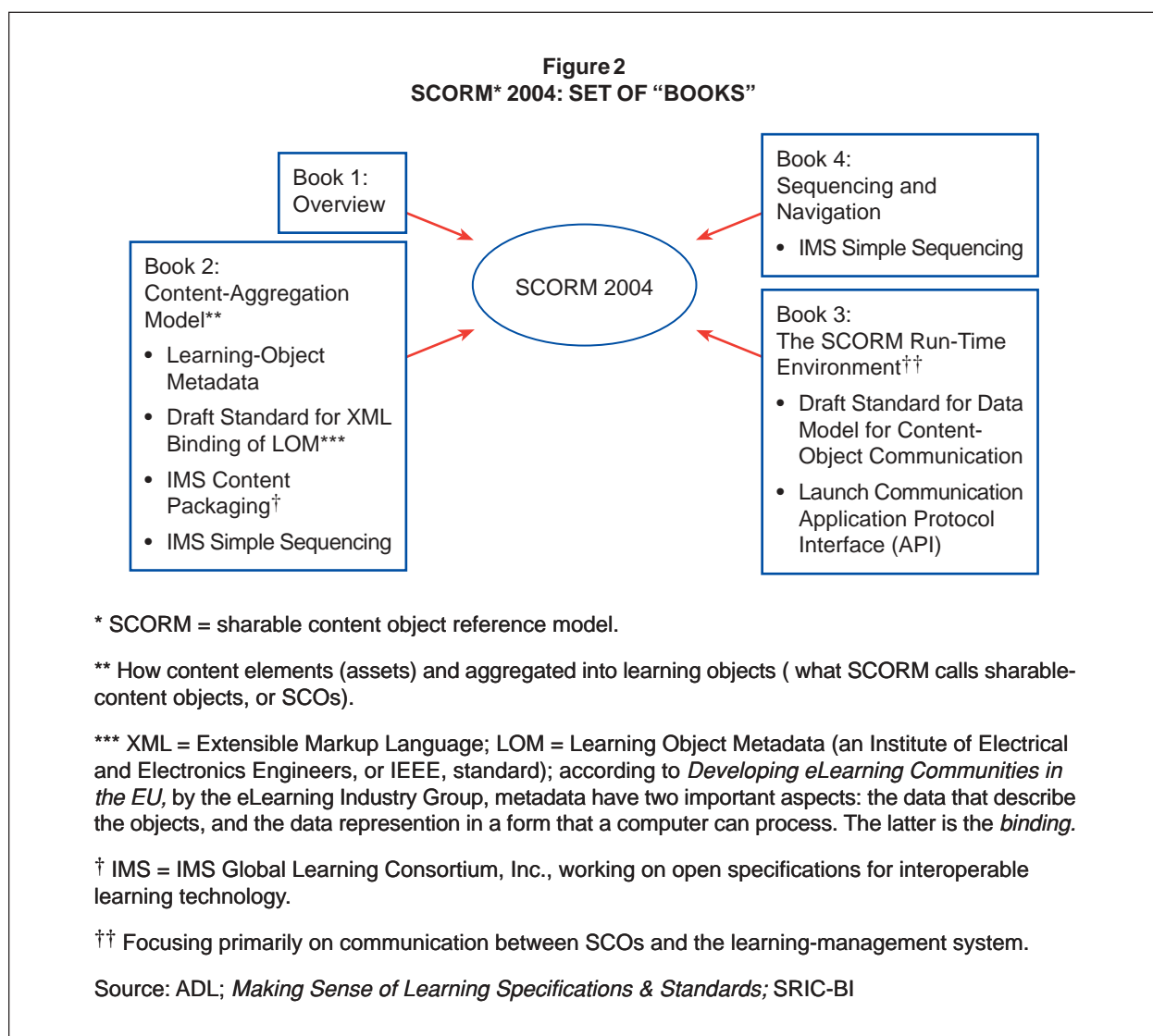
According to Paul Jesukiewicz, director of the Alexandria ADL Co-lab, SCORM is a “software model that defines the interrelationship of course components, data models, and protocols such that content ‘objects’ are sharable across systems that conform with the same model.” SCORM aims to foster the use of reusable learning objects—or sharable-content objects (SCOs), which are the lowest level of granularity of learning resources that a learning-management system can track (SCOs are also independent of learning context)—within a common technical framework for computer and Web-based learning. SCORM describes that technical framework by providing a harmonized set of guidelines, specifications, and standards—drawing, as we note above, on the work of numerous other learning technology organizations and standards bodies in the United States, Europe, and Asia.

Key elements of SCORM—a framework that is evolving over time to include new functionality to enable a wider range of capabilities for developers and learners and to enable richer learning experiences (see below)—include the following:

- *Application programming interface (API)*. An API enables communication of information about a learner’s interaction with content objects (for tracking to determine course completion or performance or for personalizing the learning path).
- *Data model*. A standard set of data elements helps to define communicated information such as the status of the learning resource (and defines, for example, elements that both the LMS and learning content should know about). Some people see a data model as similar to an architect’s building plans.
- *Content-packaging specification*. This specification enables interoperability of learning content, a key feature of SCORM, so that SCORM-conformant content from any vendor (that is, content that meets all SCORM specifications) can work with any SCORM-conformant LMS.

- *Metadata*. “Data about data” are necessary to describe content so that users can discover and reuse it—and metadata serve at different levels of content (see below)—because reusing content (in repositories) can enable more cost-effective development of learning content.
- *Sequencing rules*. These rules will either be “hard coded” into software or used by content developers to create courses (by assembling learning objects) and effective learning experiences.

These major elements of SCORM often appear in the context of “the four books,” as Figure 2 explains. Together, these elements provide a reference model and framework that now provides essential parts of the technology infrastructure necessary for a learning-object-based approach—as well as for what the U.S. Internal Revenue Service (IRS; see **CASE STUDIES**) and others hope will also enable performance support based on granular learning content.



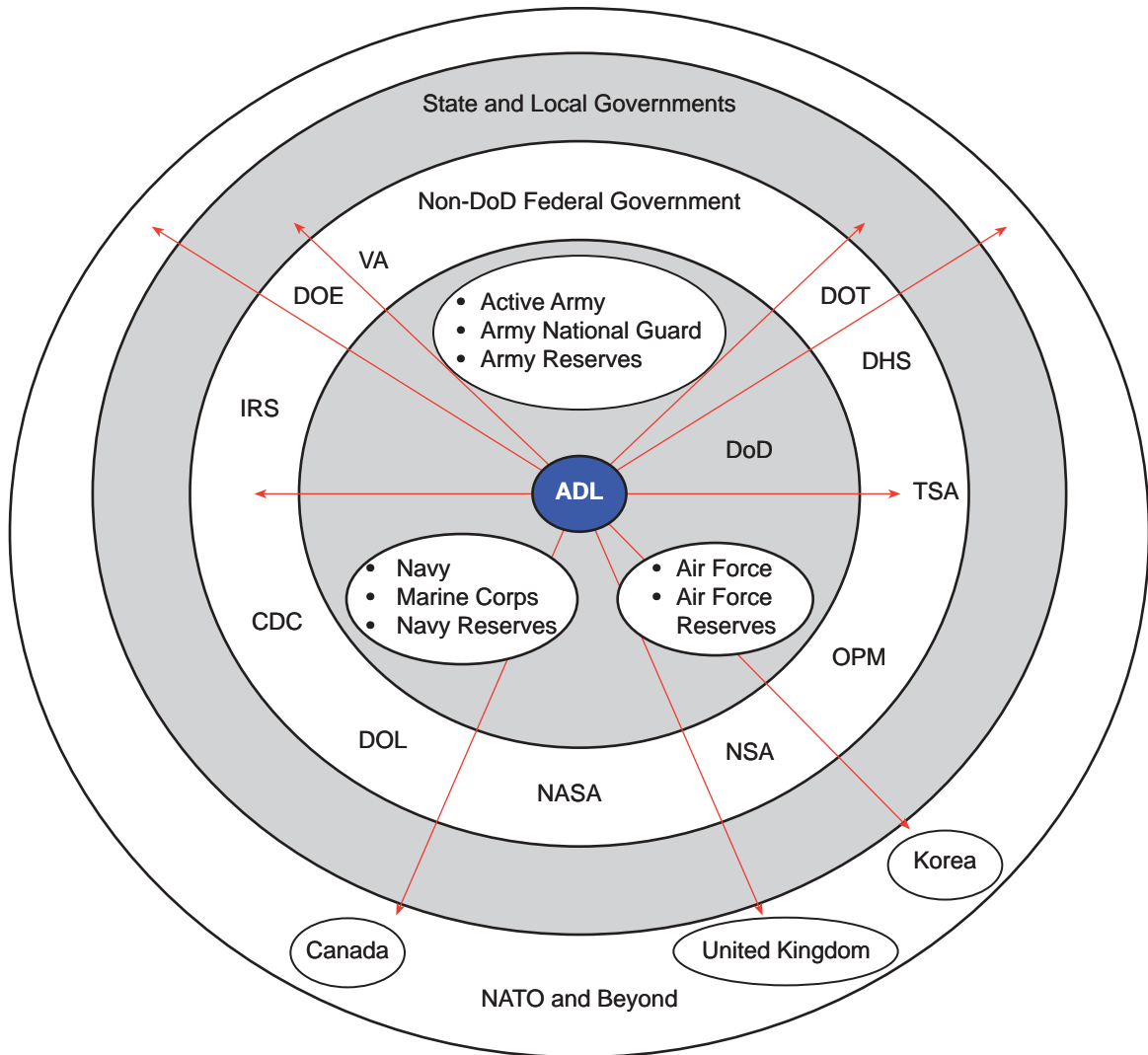
SCORM Adoption

Some eLearning vendors believe that their offerings are superior to standards-based solutions (which tend to lag behind proprietary technologies because standards organizations use collective decision making) and that their competitive advantage is undermined by standards-based solutions. Consequently, many eLearning vendors with proprietary technologies and approaches have been slow or reluctant to embrace SCORM. Nevertheless, growing acceptance of SCORM has taken place among both eLearning vendors and users, not just in the United States but also in other countries. This development is a result of the growing recognition that standards-based solutions have significant benefits, especially in the long run. In addition, as more and more organizations embrace SCORM and share lessons and implementation experiences—a major objective of this report—deployment of SCORM becomes easier. We heard a number of times during our interviews for this report that no viable alternative to SCORM exists for people who are looking to achieve the various benefits that this model offers. Although some people claim that SCORM is less suitable for schools and universities, SCORM is seeing increasing embrace in these sectors.

Because SCORM came out of ADL and DoD, the fact that the U.S. Army, Navy, Air Force, and other DoD agencies have been well represented among the early adopters of SCORM is not surprising. Currently, a DoD directive is in preparation to make SCORM mandatory for all eLearning initiatives in DoD. Other government departments and agencies of the U.S. federal government have also increasingly embraced both eLearning and SCORM, and this response is extending to state and local governments in the United States and other countries (see Figure 3), as well as to private-sector organizations.

Although SCORM, at least until now, has focused on self-paced and self-directed learning experiences of single learners and thus not dealt with games and simulations or more collaborative learning environments, SCORM-based eLearning does not preclude more collaborative learning environments and functionality to be built around the more narrow, single-learner experience of the current SCORM model. And Judy Brown, the director of the Academic Co-lab at the University of Wisconsin System, notes that SCORM in its current form has not kept growing numbers of schools, higher-education institutions, or technology vendors serving these markets from embracing SCORM. Brown also noted that “all the major players in the Higher Education market have become SCORM 1.2 certified and all have expressed plans to become certified for SCORM 2004” and that the power of tracking and sequencing, in particular, has been increasingly recognized by more organizations (see Figure 4). As evidence of the growing relevance of SCORM for higher education, Blackboard—one of the leading course-management system vendors to the higher-education market—showed SCORM in a recent presentation (at the Alt-I-lab conference in July 2004) as having the highest “level of interest” and the greatest “product implementation” ranking in a figure showing groups and standards that the company follows.

**Figure 3
SCORM GOVERNMENT-ADOPTION PATHS**



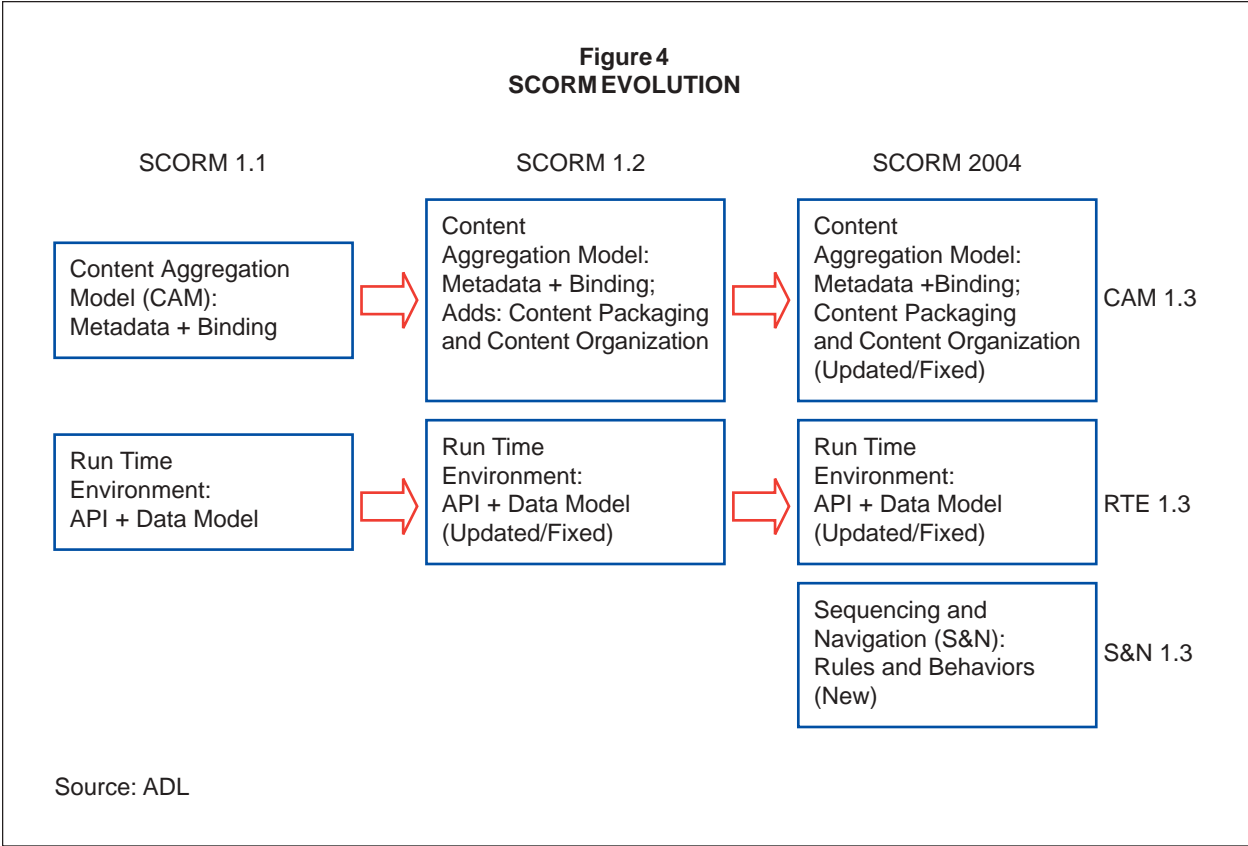
Note: IRS = U.S. Internal Revenue Service; CDC = U.S. Centers for Disease Control and Prevention; DOL = U.S. Department of Labor; NSA = U.S. National Security Administration; OPM = U.S. Office of Personnel Management; TSA = U.S. Transportation Security Administration; DHS = U.S. Department of Human Services; VA = U.S. Veterans Administration; DOT = U.S. Department of Transportation; DOE: U.S. Department of Energy.

Source: SRIC-BI

As Figure 1 shows, the United Kingdom and Canada have particularly close collaboration with ADL Co-labs and are the only countries outside the United States that have their own ADL-affiliated learning-technology laboratories. It is therefore not surprising that both countries are among the leading early adopters of SCORM,

particularly in the military. The U.K. Minister for Defense Procurement announced an interesting initiative in June: It had awarded BT a contract with estimated value of £25 million for a “Defense eLearning Delivery and Management Capability” (DELDMC)—encompassing an LMS and an LCMS—driven in part by a goal of greater content reuse throughout the ministry. According to British analysts, the DELDMC “industry standard” apparently is very close to the SCORM 1.2. Other NATO members, including Norway, are also using SCORM 1.2 or SCORM 2004 as the basis for their eLearning initiatives.

In the Asia-Pacific region, Korea has long been an aggressive adopter of eLearning and now has one of the most advanced technology infrastructures in the world—it enables faster delivery and more media-rich content than most other countries offer. Korea has embraced SCORM to higher degree than most other Asia-Pacific countries (though the Australian government and private sector have also shown strong interest in SCORM). Interestingly, however, Singapore has seen much slower adoption of SCORM in either the government or the private sector (see the box on page 11). This recalcitrance is surprising because Singapore has long had strong interest in eLearning and launched an eLearning Competency Center in December 2001 (after a number of years of preparatory work) to enable collaboration between government, industry, and academia in eLearning).



SCORM ADOPTION IN KOREA AND SINGAPORE

SCORM (sharable content object reference model) is seeing strong adoption in Korea, especially in the government sector but also in the private sector, according to representatives of the Korean eLearning industry. According to Choon Won Park of AlexIT and Alpha Lee of Dunet, the following developments illustrate growing support for and use of eLearning by the government as well as increasing SCORM adoption:

- An eLearning Promotion Law passed in January 2004, and a number of major government departments (including the Ministry of Labor; the Ministry of Commerce, Industry and Energy; the Ministry of Information and Communication; and the Ministry of Defense) have established policies to support eLearning and to expand their budgets for eLearning.
- From August 2004, all government organizations must use eLearning for at least 20% of their learning and training.
- The Ministry of Defense decided in 2003 that SCORM is one of the most important reference models for eLearning to use for the Korean military.
- The Korean Army College required SCORM 1.2 conformity for its selection of learning-management systems (LMS) and learning-content-management systems (LCMS) for 2004.

In the private sector—where interest in deploying LMS and LCMS is growing—a growing number of requests for proposals now specify that eLearning products must be SCORM conformant.

According to Lim Kin Chew, executive manager of the eLearning Competence Center in Singapore, SCORM adoption and interest in Singapore have not yet been very strong. The following characterize the current situation in Singapore:

- The use and adoption of the SCORM specification in the various ministries and departments of the Singapore government have not been very widespread—and a recent launch of the eLearning portal for the Singapore Civil Service based on proprietary technology is indicative of the present situation.
- Speed of development is more important to most government departments and agencies than using and adopting eLearning standards.
- The Ministry of Defense is aware of SCORM but is not yet using SCORM for its courseware.

Issues and Critique

Because SCORM 1.2 has not been available for very long, and SCORM 2004—with its more attractive features of sequencing that many users want to deploy—is just now coming out of development, the fact that the reference model has been missing many of the elements that learning and training professionals know are important for designing effective and engaging learning experiences online is not surprising. And because the focus and attention so far have been mostly on the underlying and enabling technology

infrastructure (or the “plumbing”), little attention has yet gone to design issues to ensure effective learning. Some critics argue that even well-functioning technology and infrastructure are no guarantee that clean, fresh spring water rather than sewage will come through the plumbing that has now been put in place. How people use the technology will be a key determinant for what the end result is in terms of learning effectiveness and learner satisfaction—and this end result in turn will depend on people (including instructional designers) and processes.

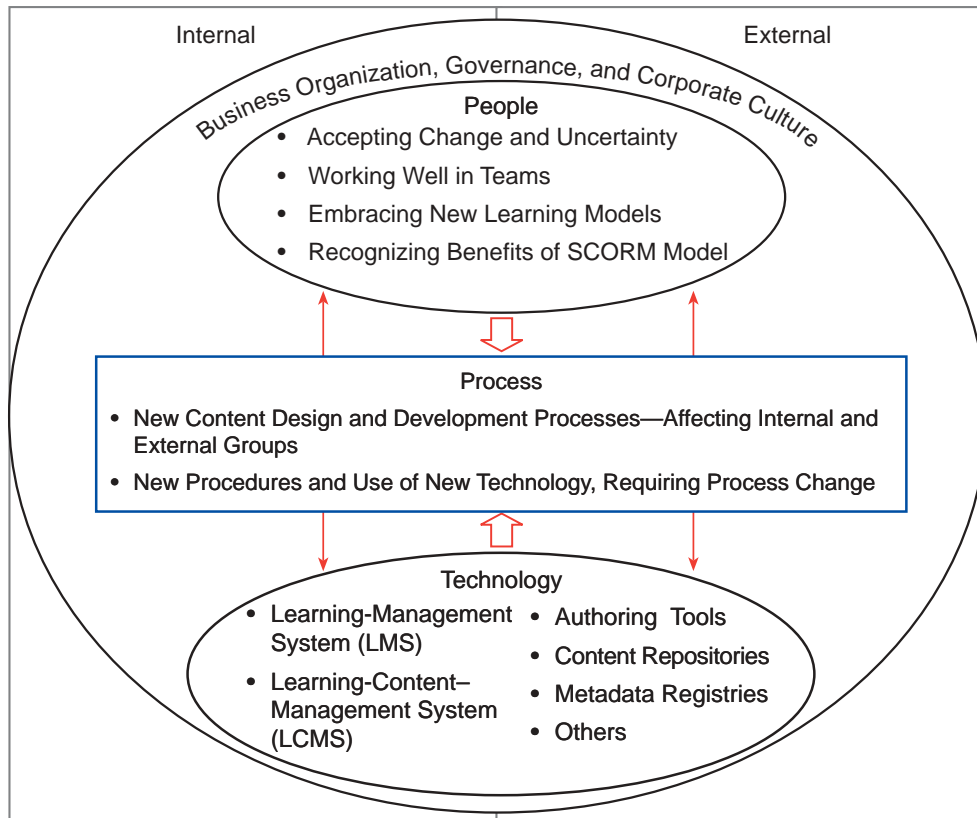
Much concern exists about whether use of learning objects can result in successful learning design, particularly because very small and granular learning objects may make it difficult to capture learning context. Smaller learning objects allow easier reuse and thus enable greater flexibility and cost savings in content development; larger learning objects can include greater context and thus likely result in greater learning effectiveness. Optimal assembly of learning objects and the extent of context that should surround the learning objects or assembly will therefore depend on what decisions an organization makes about the size of learning objects (or SCOs).

Effective SCORM implementation will require some changes in organizations’ learning and training operations. Change does not come easy to most organizations, and people often resist change, especially if change implies additional work and cost and if benefits are not immediate. SCORM is clearly work in progress, and much remains to do before SCORM will enable the kind of rich online learning experience that we know is possible. ADL staff and partners know this truth, and most of their current projects illustrate what new elements and features they hope to build into future generations of SCORM to make it better (see **THE FUTURE OF SCORM**). The case studies in this report illustrate what the current realities are for some very different organizations that are currently active in SCORM-based eLearning implementations.

IMPLEMENTATION ISSUES AND CHALLENGES

The case studies in the following section discuss implementation issues and challenges within the specific organizational contexts of the DaimlerChrysler Academy (DCA), the IRS, Eurocontrol (the European Organization for the Safety of Air Navigation), and International Virtual Medical School (IVIMEDS) and MedBiquitous. This section provides a brief and general discussion of key conclusions that we can draw from both the case studies and discussions that we have had with other organizations about major issues and challenges resulting from SCORM-based eLearning implementations. These conclusions fall primarily into the three key areas that Figure 5 notes.

Figure 5
KEY DRIVERS OF SCORM IMPLEMENTATION SUCCESS



Source: SRIC-BI

People, Processes, and Technology

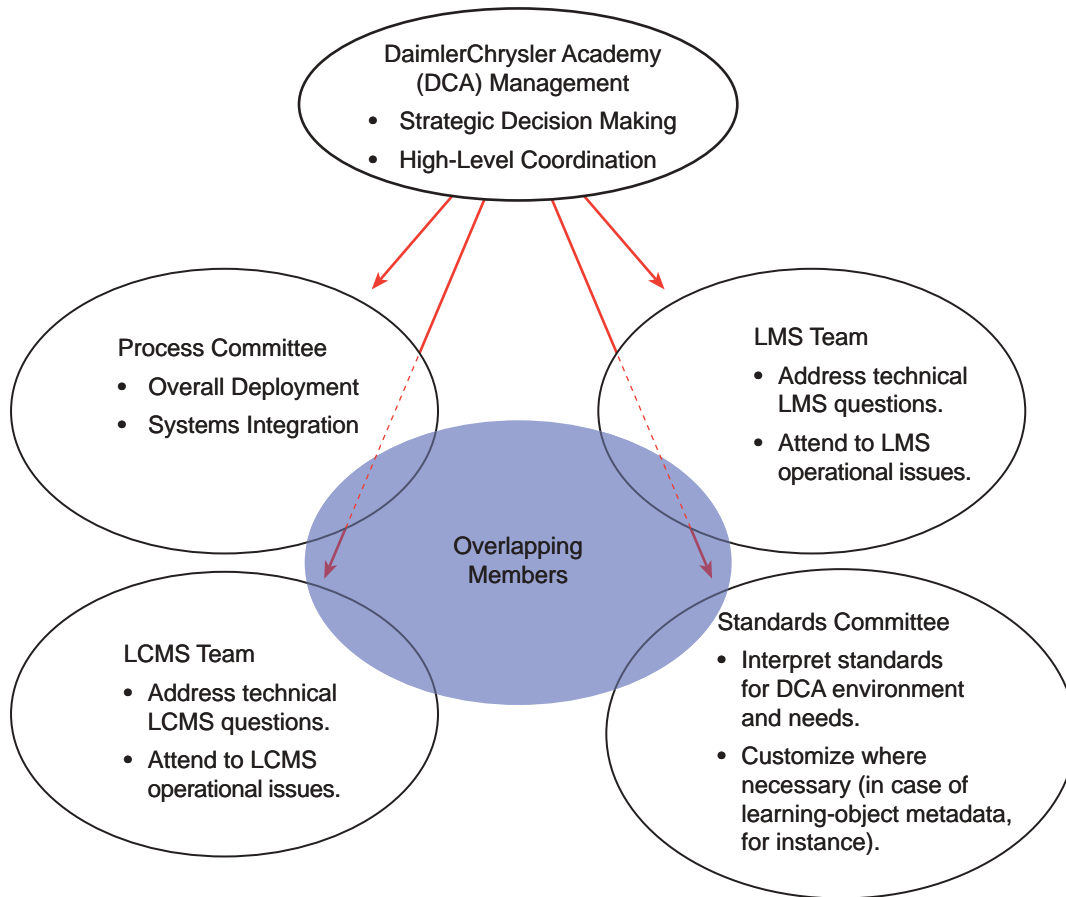
Implementation of SCORM-based eLearning initiatives works best when an organization has people who deal well with change and the inevitable uncertainty that comes with embracing a new and different approach to learning and training. Building learning objects, sharing and reusing such objects, and designing online courses by assembling learning objects may involve working with new authoring tools (that can produce SCORM-conformant content packages) and using new procedures that some people may find constraining and difficult. Internal and external content developers need to learn how to build SCOs correctly and assign the correct metadata. New tasks and procedures that add to the existing workload of employees will cause resistance unless the employees recognize the personal and organizational benefits.

The case studies will show different ways in which organizations have responded to the need to involve as many people in the organization as possible, at least in creating awareness and understanding of why a SCORM-based eLearning initiative has launched, how both the organization and individuals will benefit, when such benefits will likely materialize, and what the impact will be on employees and the organization as a whole during the implementation phase. Organizations have often found that they did less on this front than they should have done. As a result, many employees have not understood the initiative or how it would affect them.

Creating new committees, teams, or other organizational units to take on operational responsibilities and to ensure effective coordination and communication will also increase the likelihood of successful deployment. Coordination and communication are particularly important because SCORM-based eLearning initiatives in most organizations, especially large ones, will extend over a considerable period. In the context of a metadata discussion, the Masie Center report *Making Sense of Learning Specifications & Standards* offers the following observation: “It will be more of a marathon than a sprint and should be viewed as the development of a process model and policies for long-term use rather than simply a project. Many experiences show that it has taken a year for organizations to define metadata for their needs. They are still tweaking because it is necessary for their metadata to be integrated with such things as their LMS or ERP [enterprise-resource-planning] systems and for content repositories to exchange (meta) data.” Having teams and committees in place to guide the operational processes as well as coordinate and communicate with various user communities throughout the organization is therefore important. Figure 6 shows what teams and committees DCA created to help ensure success.

Making technology decisions can be painful and difficult. Because LCMS is a key component of most large SCORM-based eLearning initiatives, projects involving prototyping or pilots and finally the acquisition of an LCMS are often necessary. The use of teams and committees like those used by DCA will ease the pain of making these technology decisions. As both the DCA and the IRS case studies show, their new learning platforms involve authoring tools that may or may not be part of the LMS and the LCMS, and integration to ensure that these components work well together is imperative. Often these systems may also need integration with enterprise-content- (or asset-) management systems, document-management systems, enterprise-resource-planning systems, and customer-relationship-management systems. Because systems integration can be time-consuming and problematic, many people hope that Web services will come to the rescue. They could play an important role in integrating major systems and applications and enable an environment in which organizations can more easily and flexibly access disaggregated, Web-services-based functionality that larger, unified systems now bundle together. IVIMEDS hopes to see this scenario (although it has made no decision yet about technology architecture). Although Web services will no doubt aid integration issues, the impact that they will have is uncertain, and vendors and adopters should be wary of hype that they will provide a silver bullet.

Figure 6
ORGANIZING FOR SCORM SUCCESS



Source: David Ealy; SRIC-BI

Key Challenges

Some of the issues above could develop into important challenges to the eLearning team or to senior management if they do not receive attention—and in some cases, could seriously undermine or at least delay the success of the eLearning initiative. Some key challenges facing several organizations include:

- *Demonstrating business value and impact.* Any initiative gains stronger support and buy-in when one can show clear business benefits. Before an organization has many of the main pieces of its eLearning environment and new processes (especially for content development) in place, it will not achieve significant benefits. Employees will also

require time to understand how to use the new systems and processes and to put them to full use. Significant reuse of content (SCOs), for example, will take some time as developers learn how to use new design processes to create content for reuse.

- *Improving efficiency of course development.* The benefits of content (learning objects; SCOs) reuse and quickly being able to locate and access SCOs for cost- and time-efficient course development are not evident until a significant number of SCOs populate the repository and developers correctly assign metadata so that SCOs are easy to find and use. Organizations face considerable investment in time, money, and effort before realizing benefits to employees, which could undermine the support of the initiative. Consequently, strong senior-management commitment and a strong program to educate everyone about the initiative are important.
- *Deciding on the optimal SCO size and structure.* In the SCORM model, no communication (with the LMS) takes place at a level below the SCO. An organization must therefore think carefully about not only what course-aggregation model to use but also what its tracking and reporting needs are and what those needs mean for the SCO size it should use. Organizations also must decide how they want to structure the learning objects (Cisco's reusable learning objects have the following structure: concept, fact, principle, process, and procedure; see *Creating A Reusable Learning Object Strategy*, by Chuck Barritt and F. Lee Alderman Jr.)
- *Implementing SCORM as it evolves.* Although ADL now hopes to stabilize around SCORM 2004 for a while—and no major revisions are likely in the short term—SCORM is, and will remain, a work in progress for the longer term, and much remains to do before the reference model addresses a range of issues that various constituencies want to see in SCORM (see **THE FUTURE OF SCORM**). Although ADL is working on tools, such as a metadata converter, to make the transition easier, any change will reverberate to some degree through and affect technology, people, and processes. But, as someone told us in our interviews, “since there is no viable alternative to SCORM and there is no best time to jump on the train, we can just as well do it now.”

CASE STUDIES

The SCORM-based eLearning initiatives of five organizations illustrate the range of issues that organizations face and must address in the context of their unique organizational and operational settings. The organizations have very different characteristics, but two—MedBiquitous and IVIMEDS—are similar and complementary and therefore appear together in the last case study. Table 1 provides a brief summary description of each organization and the current status of its SCORM-based eLearning initiatives.

**Table 1
SUMMARY DESCRIPTIONS OF CASE-STUDY ORGANIZATIONS**

Organization	Brief Description	Current Status of SCORM-Based eLearning Initiative
DaimlerChrysler Academy (DCA)	DCA employs 225 people and is the largest of 15 training providers in DaimlerChrysler. DCA serves 4150 retail dealerships across the NAFTA* region and corporate field personnel.	SCORM (sharable content object reference model) strategy developed in early 2003. It has all technology elements of its learning infrastructure in place and is putting in place processes to create, manage, and deliver SCORM-based content. DCA plans to "go live" with SCORM 2004 in February 2005.
Internal Revenue Service (IRS)	IRS educational community consists of 765 full-time employees in various learning functions serving numerous business units (the two largest of which have approximately 85 000 employees) and a total IRS workforce of 120 000.	IRS put elements of eLearning and SCORM strategy in place mid-2001. It has successfully deployed metadata registry and is now deploying new learning-management systems (LMS) and will soon procure learning-content-management systems (LCMS). Progress on learning-object-based content development has been significant.
Eurocontrol	The European Organization for the Safety of Air Navigation employs 2500 people, with 80 full-time employees in its training institute. The organization serves 33 member countries across Europe.	The eLearning operation within mostly classroom-based learning is small, but the role for eLearning is increasing. Significant use of SCORM-based eLearning began in 2002 and will likely serve in an application-service-provider function vis-à-vis most member countries.
International Virtual Medical School (IVIMEDS)	IVIMEDS is a consortium of more than 40 medical schools from around the world developing eLearning solutions for medical and health care using learning objects and virtual patients and practices.	IVIMEDS has completed a proof of concept and is now working on more rigorous testing of various elements of its ambitious initiative. It has chosen an LCMS product for this phase but has made no final decisions about technology architecture and tools and has many business-model issues to work out.
MedBiquitous	The consortium consists of mostly U.S. professional medical societies, pharmaceutical companies, and universities developing information technology and standards for medical education and publishing.	The organization has been in operation since mid-2001 and has a number of working groups that are actively developing elements of its overall standards framework. One of these elements is the MEDBIQ-SCORM metadata specification.

* NAFTA = North American Free Trade Agreement.

Source: SRI Consulting Business Intelligence (SRIC-BI)

DaimlerChrysler Academy

DaimlerChrysler Academy's responsibility is to provide and support sales and marketing education and training to audiences inside the DaimlerChrysler Corporation (DCX) and to external retail dealerships in the NAFTA region (that is, the United States, Canada, and

Mexico). Although DCA is the largest training provider (in terms of staffing), it is only 1 of 15 training providers inside DCX worldwide. DCA's target group encompasses 4150 retail dealerships and corporate "field" personnel. Whereas the latter consist of approximately 1000 people who interact with the dealership community, the total number of learners in DCA's target group is approximately 140 000 (or somewhat larger than the total number of IRS employees).

The learning context for DCA's programs is specific to Chrysler, Jeep, and Dodge products, as well as to dealership operations. Like most other large organizations that are decentralized, DCA recognizes that eLearning is a way to reduce training costs and increase the flexibility of these learning operations and increase the number of ways to deliver training to the field. Although DCA is only one of the training providers inside DCX, most of the other training providers recognize it as a leader, at least informally, when introducing and evaluating new learning technologies.

Background and Context

In the second half of 2002, DCA management conducted a comprehensive analysis of the learning technologies at DCA. The analysis included interviews with approximately 100 stakeholders covering many knowledge domains and areas of responsibility. Because DCA already had an LMS in place—which managed DCA's instructor-led resources, self-study resources, certification-related training, and Web-based training—the analysis focused on what LCMS functionality DCA needed for its future eLearning initiative. This analysis yielded a comprehensive report in the fall of 2002, detailing desired LCMS functionality as well as a number of LMS- and LCMS-related issues, including performance problems in Web-based courseware, inadequate assessment capabilities, and the need to streamline the overall eLearning system to reduce costs. In addition to doing the analysis and report in the fall of 2002 on LCMS functionality, DCA conducted a similar analysis specifically on LMS functionality. This analysis, like the LCMS effort, yielded an "LMS-vision" document.

In early 2003, having just identified and documented necessary LCMS and LMS functionality, DCA management began to formulate a new strategy about the overall eLearning platform and related processes. This new strategy involved the adoption and integration of SCORM, switching from a "proprietary system" to an open system based on SCORM and a focus on refining the new processes that would be necessary. As a result, throughout 2003 DCA began to focus and work on the following:

- *Strategy documentation.* Work on documenting the new eLearning strategy, which included SCORM (Version 1.2), began with an identification of the basic eLearning components that were necessary given DCA's learning needs (mostly identified by the 2002 analysis). These components include a "SCORM-ready" authoring tool (see below), a SCORM-conformant LMS, and a SCORM-conformant LCMS. DCA decided, given SCORM's interoperability and DCA's unique learning needs, that DCA should have the key eLearning platform components from separate vendors (**eLearning Organization, Adoption, and Experience** explains this decision).

- *Authoring tool evaluation.* DCA, like other large organizations, has internal and external content developers. Given the skill set and development needs of the internal developers—mostly of trainers or subject-matter experts—DCA recognized that to have user-friendly authoring tools with the ability to produce SCORM-conformant content packages would be advantageous. These SCORM-ready authoring tools would create an `imsmanifest.xml` file and the other related SCORM files inside a “.zip file” or package without requiring knowledge of XML (Extensible Markup Language) or a programming language like Javascript (see Figure 7 on page 24). An authoring-tool-evaluation process started around March 2003. An easy-to-use SCORM-ready authoring tool was primarily for the internal content developers because the external content developers—and currently DCA uses 13 of them—have specific expertise with DCA content, existing processes, or media-management capabilities.
- *LCMS evaluation.* On the basis of the analysis in 2002, DCA created a required LCMS feature set (which the IRS is completing right now) and began to solicit quotes and evaluate several LCMS products. It selected an LCMS in March 2004 (in late 2004 or early 2005, the IRS is likely to do so). The new LCMS was not dependent on or linked to an LMS or authoring tool.
- *Standards.* In December 2002, for the first time, DCA introduced SCORM (Version 1.2 draft) into the instructional-design standards documentation. This introduction included creating a new content-aggregation model (CAM) specific to DCA, identifying metadata specific to DCA, and modifying all the courseware-to-LMS interaction/data-passing requirements. DCA created a cross-functional committee to manage the changing standards. This committee meets, either virtually or face-to-face, every other week in an ongoing process.
- *New processes or workflow development.* In July 2003, DCA began to identify and document new processes and workflow changes based on the new eLearning platform. These processes involved creating courseware, moving content into the LCMS, and moving content from the LCMS to the LMS and then to the learner. For example, the new LCMS would now require only that content be SCORM (Version 1.2) conformant in order to be “ingested” into a repository. DCA could then manage content in the repository, modify metadata, resequence or modify content, and then deliver it, via the LMS, to the learner. DCA has also created a cross-functional committee to document and manage process implications of changing standards—also an ongoing process (see Figure 6 on page 15).

As of July 2004, DCA is in the beginning or initial phase of SCORM 2004 (see Figure 4 on page 10) integration and implementation. It has selected the eLearning components and is currently implementing them, with March 2005 as the go-live date. Going live involves all three components—authoring tool, LCMS, and LMS—working together in a SCORM environment (by the go-live date, SCORM 2004 will be applicable). Table 2 highlights how DCA views the three components’ scope, major features, and access.

Table 2
DCA'S eLEARNING PLATFORM COMPONENTS

Component	Scope	Major Features	Access
Authoring tool	Content creation	<ul style="list-style-type: none"> • Sharable-content object- (SCO-) ready file creation (for example, to include imsmanifest.xml) • Templates common to DCA • Metadata-creation flexibility 	Developer, administrator
LCMS	Content management	<ul style="list-style-type: none"> • Content-object repository based on DCA's Content Aggregation Model • Web-based SCO-management (add/delete/modify/publish) • Development and testing platform based on roles 	Administrator, manager, developer
LMS	Delivery and access	<ul style="list-style-type: none"> • Management of access to multiple types of learning content based on DCA's roles and requirements • Delivery and tracking of course-level content • Management features based on role 	Learner

Source: David Ealy; David Hooten and Bonnie Beresford from DCA

Not only does the DCA management view the new eLearning platform and strategy as means to achieve reduction in development or travel-related costs, but also it sees the longer-term potential to transform knowledge management and delivery. More information about how DCA intends to move into the next phase of this process follows.

eLearning Organization, Adoption, and Experience

DCA has long recognized the potential of eLearning and has, since 2000, focused on:

- *Creating a new learning environment.* The goal is to lower costs, increase retention, and create dynamic measurement and reporting opportunities.
- *Improving business performance.* The goal is to support retail and field performance by providing a one-stop shop for learning solutions, performance-improvement tools, and electronic-performance support tools.

These two high-level goals were the genesis of the new eLearning environment at DCA in 2004. To help build this environment, the organization divided, in part, by technical infrastructure or component (LMS versus LCMS) responsibility and content development and processes responsibility. DCA intentionally created overlap within and between these groups (with several members serving on each of the teams and

committees below) and organized the following committees and teams (each with six to eight members) to manage the new learning, technology, and process environment:

- *LMS team*: managing LMS and issues relating to integration with LCMS
- *Standards committee*: integrating SCORM into the current standards
- *LCMS committee*: deploying the LCMS and its integration with other elements of the learning platform
- *Processes committee*: managing the overall deployment and integration processes.

Currently external vendors, primarily, are building SCORM-conformant content (Version 1.2), and it is having tests inside DCA's eLearning platform. Adoption of the standards by the external content-development vendors has yielded varying results, primarily because of the varying levels of understanding of SCORM as well as DCA's new eLearning platform. Because DCA is just deploying the eLearning platform and is just introducing current SCORM standards into the documentation, work processes, and DCA as a whole, the new DCA learning environment is still in a transition phase. But given the experiences so far, the organization has learned the following lessons:

- *SCORM education*. Although SCORM standards are well written and resources are readily available, many of the external content developers have a different interpretation of the basic SCORM. This difference was and remains an issue as DCA moves to clarify and customize the SCORM standards to DCA's intended use. Both external and internal stakeholders—many serving on the committees and team above—have varied levels of understanding of DCA's intended use of SCORM. The evolving nature of the standards (1.2 to 2004) compounds this issue slightly. Although the low-hanging-fruit answer seems to be to educate internally and externally, the education effort takes on many different forms: content development standards relating to CAM, tool specifications for ingesting courseware without the DCA-required metadata, and processes for updating a course (2004 courses). All these issues require not only an understanding of SCORM, but also an understanding of how DCA interprets the standards based on the unique learning environment currently in use, which creates a unique opportunity for "SCORM experts" who have an understanding of the authoring tool and LCMS and LMS operations at DCA. In the recent past, this role was played by one or two external content vendors at DCA who had a deep understanding of SCORM. Currently three or four individuals serving on the committees are filling this role. Communication and collaboration among the committees and teams working on different parts of the eLearning environment have also been helpful.
- *Metadata*. In mid-2003, DCA started to customize metadata on the basis of the existing requirements related to course title, description, keywords, copyright and restrictions, and the like. This process led to a customized metadata table based on DCA's needs. The process involved reviewing each metadata field one by one with the entire standards committee present. DCA reviewed each field and asked, "How does this field apply to DCA?" Once DCA accepted the field, DCA created a specific example and added it to the table for reference. Once DCA set the metadata, DCA had to program/

customize the LCMS to allow for display (in the interface) of the DCA set of metadata. This display would allow the developers to modify metadata as necessary inside the LCMS, which in turn created a new process for DCA that required validation and documentation.

- *CAM.* Like it has for the metadata, DCA has a customized CAM. DCA’s CAM is based on the standards document for SCORM Version 1.2. At present, it has a minimum of three levels: a course level (aggregation), a lesson level (aggregation), and a learning-object level (SCO). DCA learned that coordination has to exist between the content developers and the LCMS, in the sense that the LCMS object repository must be able to display the DCA CAM now and in the future. DCA found that, as in the case of SCORM, not restricting the developers’ ability to create courses with varied levels and varied sequencing information was the only option when setting the CAM minimum standards. This work is in progress at DCA.
- *New processes and integration.* DCA has recognized systemically interrelated effects that the SCORM standards have on the eLearning platform and related work processes. For example, a modification or change to the CAM model or metadata will set in motion a ripple effect across the platform (as with most standards), which has created the need to validate and document any new process. In one example of a new process, content vendors must have a SCORM-conformant resource package—with test log—for the LCMS to ingest a course. This process is an example of a “vendor-to-tool” process that is new and requires validation. DCA’s eLearning platform has three components, and the example introduces a new “tool-to-tool” kind of SCORM-related process that also requires validation. For example, the LCMS gives a developer the ability to add a SCO to an existing course. Once the developer has done so, the LCMS must communicate that fact to the LMS. Although each of these examples seems, at least technically, basic in nature, they cut across disciplines and, at DCA, committees. Work to validate and document these processes continues at DCA.

Integration and Process Experience with SCORM

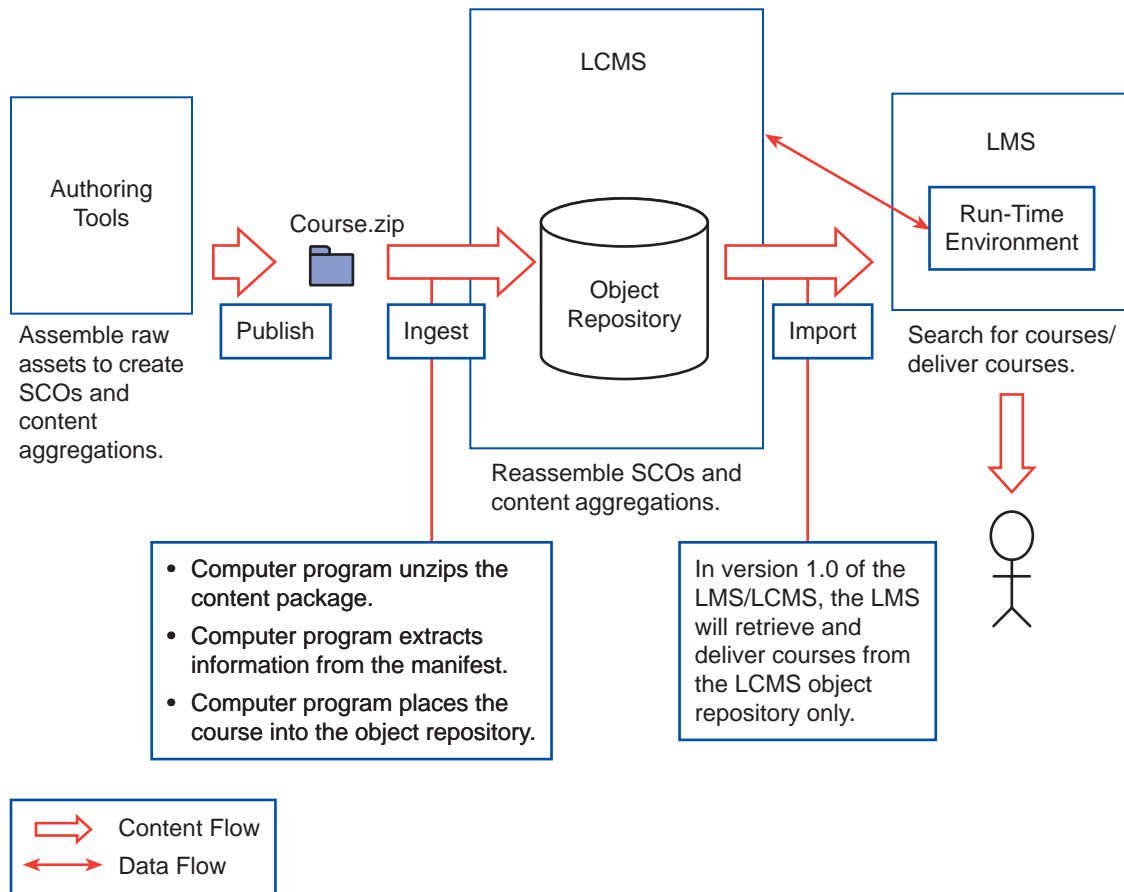
Although some components of the new DCA eLearning platform have been in place for a few years, the SCORM context introduced by the new eLearning strategy changed the overall integration scope by enabling DCA to have greater interoperability between and among the three key platform components (see Figure 7). DCA chose to have three separate components—authoring tools, LCMS, and LMS—from separate vendors, primarily for the following reasons:

- *Interoperability.* SCORM has given DCA the ability to standardize both content development and component conformity. This ability means that if content is SCORM conformant and the LCMS and LMS are also SCORM conformant at the same level (content and components conforming to the Version 1.2), content from multiple vendors should be “manageable” by the system based on DCA’s workflow. DCA is

currently creating the new processes for content development and content integration with and into the LCMS and integrating the LCMS and LMS. It has so far found that integration has revolved around the following:

- Ensuring that it can build or form the DCA content-aggregation model in the DCA-approved authoring tools.
 - Ensuring that the LCMS displays the DCA-approved metadata.
 - Identifying and aligning the new capabilities of the learning system with the job function by role (see the discussion below) inside DCA and for the external content-development vendors. (For example, developers—a DCA-specific role—can access the object repository only inside the LCMS, and once inside, they have limited access via authentication upon login to specific courses.)
 - Creating an automatic communication process between the LMS and the LCMS about course modification and availability alerts. (For example, the LMS must know when a course is ready for delivery or has had modification in the LCMS.)
-
- *Cost-effectiveness.* DCA conducted a build-versus-buy analysis in 2003 and determined that the cost of customizing an existing LCMS would be the most logical solution given DCA’s existing expertise and desire to move to an “open system,” allowing integration of other components.
 - *Quality.* DCA used a best-of-breed approach when selecting the authoring tools (and LCMS) because this strategy would produce the best overall result. DCA, like most organizations, has internal training experts who have unique skill sets that require easy-to-use authoring tools. The new breed of SCORM-ready authoring tools is a good fit for the internal developers. This approach was also validated by the fact that once the new authoring tool produced a SCORM-conformant resource package, the LCMS could ingest it easily. At DCA, the authoring-tool search revealed that tools as part of the LCMS either did not meet DCA’s ease-of-use criterion or were too complex and did not produce a SCORM-conformant resource package.

**Figure 7
DCA'S LEARNING-PLATFORM COMPONENTS AND FLOWS**

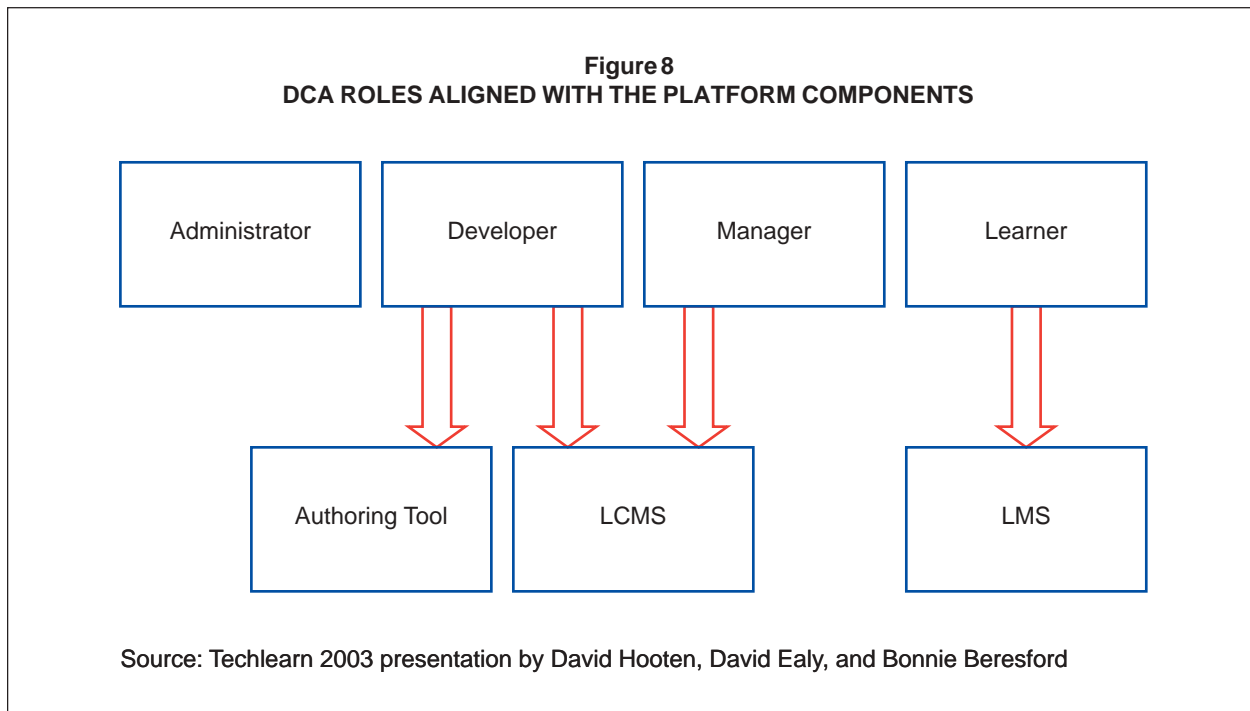


Source: David Ealy, *The Learning Touch*; SRIC-BI

The new workflow or process revolves around the publish, ingest, and import processes that DCA defines in the following way:

- *Publish*. Internal or external vendors would access assets from either DCA's existing asset-management tool or a local drive and would assemble those assets to create a SCORM-conformant package.
- *Ingest*. Once the package exists, a developer can access the LCMS and "ingest" that package into the LCMS's object repository.
- *Import*. Once they ingest the course, the LMS and LCMS communicate to indicate when a course is ready for delivery to the user, when a course has had an update, and when a course is not viewable. This process does not yet have full definition at DCA, but it is a known integration point.

To facilitate the understanding of how the processes worked relating to the three platform components, DCA started with a role-based approach—or simply, Who would be accessing what tool with what privileges? DCA created four roles—on the basis of existing roles and experience: administrator, developer, manager, and learner. The first step in the role-based approach to tool access is to align the roles with the appropriate components, as Figure 8 displays.



The next step was to align the tool functionality with the roles. For example, in Figure 8, the developer and manager both have access to the LCMS. However, at DCA, a manager and a developer have different roles relative to the LCMS. The manager can access “user rights and privileges” information, whereas the developer is limited to accessing the parts of the LCMS—like the object repository—that deal with course management. When the LCMS was in development, DCA staff copied use cases (very discrete functionality statements often used by programmers when building software) into a spreadsheet that it then used to cross-reference functionality of the LCMS and role access. For example, this spreadsheet would identify that developers had access to the specific LCMS capabilities related to the add/delete/modify metadata in the LCMS object repository.

Because the entire DCA eLearning platform has yet to launch, this process of documenting features and privileges is currently undergoing tests, validation, and documentation. Figure 8 and the corresponding cross-referencing features and privileges by role process were helpful in establishing an understanding of what role-based privileges look like against the DCA eLearning context. They were also useful in

establishing an overall view of what features each user, by role, would use in each of the platform components.

In the context of integration and process experience, the lessons so far include:

- *Content creation versus reassembling of content.* Because DCA chose to have an authoring tool that is not a part of nor does it link to the LCMS, and because the LCMS does not manage assets because DCA had an existing asset-management tool, the following issue surfaced in mid-2003: Who has the right to reassemble a course? Because DCA granted managers access to the LCMS, the managers had the ability to reassemble courses, which obviously could alter a course's original instructional intent. DCA had difficulty establishing a clear understanding of this issue. When the committees discussed roles and tool responsibility surrounding content creation and the reassembling of SCOs inside the LCMS, it raised some semantic issues and questions. One was: What is authoring? Is authoring the assembling of assets into SCOs or is it the reassembling of SCOs inside a course. This discussion is ongoing inside DCA. However, the new platform gives content developers the flexibility to create SCOs and courses from assets (either locally or inside DCA's asset-management tool) and the ability to reassemble or resequence courses once inside the LCMS (once it has ingested a course).
- *Standards.* DCA has been very good at maintaining a current version of the instructional-design standards. Frequent meetings of the standards committee were helpful when DCA introduced SCORM in mid-2003 and will likely be equally important as SCORM evolves into the 2004 version. This process has enabled DCA to set metadata and a customized CAM, which in turn enabled the LCMS vendor to customize the solution to meet DCA's needs. One example is that having definition of the CAM and metadata in the instructional-design standards made it easier to define the process of ingesting a course into the LCMS.
- *Global processes.* Having the DCA's eLearning platform in place with its separate components creates a unique environment. The SCORM context of the DCA eLearning platform brings with it a new way to look at workflow and processes—for example, because the course or resource package is standardized and can move into and between systems without a great deal of technical expertise. This capability creates new opportunities for cost savings by simplifying the handling of content. At a high level, and beyond reusability relating to content management, SCORM offers DCA benefits resulting from simply eliminating complex course-ingest or import-related issues (if the content, LCMS, and LMS are SCORM conformant). This situation is new to the DCA organization, and a great opportunity exists to baseline these efforts in an attempt to quantify and further document some of these process-related savings.

Future Plans and Challenges

Despite the work that DCA faces in the next year in integrating the LCMS with the LMS and launching the entire system, DCA management remains committed to the SCORM standard. The management at DCA understands that with any new standard or rollout, a

learning curve will inevitably exist. The following is a list of DCA's future plans and challenges, some of which are now receiving attention:

- *Maintenance of vision.* DCA recognizes that the implementation of SCORM will present the ubiquitous new-project and standards-implementation learning curve for the organization and vendors. However, DCA has committed to preparing and maintaining a strategy document that not only addresses near-term objectives—deployment/rollout and platform components—but establishes a one- to two-year outlook for the DCA eLearning initiatives. DCA management is also acutely aware that to move into more complex learning initiatives—like delivering small objects to a mobile device or allowing a prescription-based learning initiative that delivers smaller chunks of learning on the basis of an assessment—it will first have to have the platform and processes in place.
- *Measurement.* DCA has also committed to setting in place measurement mechanisms for the platform and related processes as well as for processes related to learning effectiveness (and business impact). Currently, the strategy document does not include measurement criteria for the DCA eLearning-platform rollout. It assumes that meeting deployment dates and integration and testing dates is the first step toward having the capability to baseline and measure on other levels. Measurement and measurement criteria are topics that are currently integrating into the strategy document.
- *Standards—build them, enforce them, and update them.* Standards have been a priority at DCA and will continue to be so. Most standards issues that have emerged about SCORM are generally related to interpretation rather than application. Following are two examples of interpretation issues that DCA has experienced so far:
 - How does DCA interpret “mandatory” metadata elements set in the SCORM documents? For example, does DCA have to adopt all the “mandatory metadata” fields of SCORM?
 - Given DCA's three-major-platform-component (and separate vendors for each) approach to building an eLearning platform, which component—LCMS or LMS—is responsible for the run-time environment (RTE)? Or, if DCA is deploying an LMS and an LCMS as separate components, which component will contain the RTE? (In Figure 7, RTE is in the LMS).

Having a multidisciplinary committee (and committees) to debate and interpret the SCORM specifications has been helpful to date. The latest enhancements to the SCORM framework will continue to integrate into DCA's existing standards documents and processes. This integration remains a priority.

- *Staying “learner focused.”* While the SCORM and technology (LCMS and LMS integration) rollout continues, DCA has committed to focusing on the learner. With proper alignment, much of the learning technology at DCA can help solve immediate business problems (such as reducing travel costs and reducing content-development cost by increasing reusability of content), but not all learning technologies directly result in a benefit to the learner. DCA is aware of the benefits of SCORM to

reusability, and much of the coming year will focus on reducing costs by reusing content, but the overriding push for SCORM is the ability to standardize the content into “chunks” (or SCOs) that align with a learner’s immediate needs.

U.S. Internal Revenue Service

The government sector in the United States is a major target of opportunity for all eLearning vendors, and many government departments and agencies are early eLearning adopters. Others are currently in the process of launching or accelerating their eLearning deployments. As this report notes, SCORM was launched by the DoD, which employs by far the largest number of civilian employees of any department in the federal government, and SCORM has gained a great deal of support from various government agencies as it has grown and evolved. Therefore, the fact that the IRS, with ever-changing tax rules and regulations and more than 120 000 employees, sees eLearning as a way to meet the organization’s current and future learning and training needs is perhaps not surprising.

Background and Context

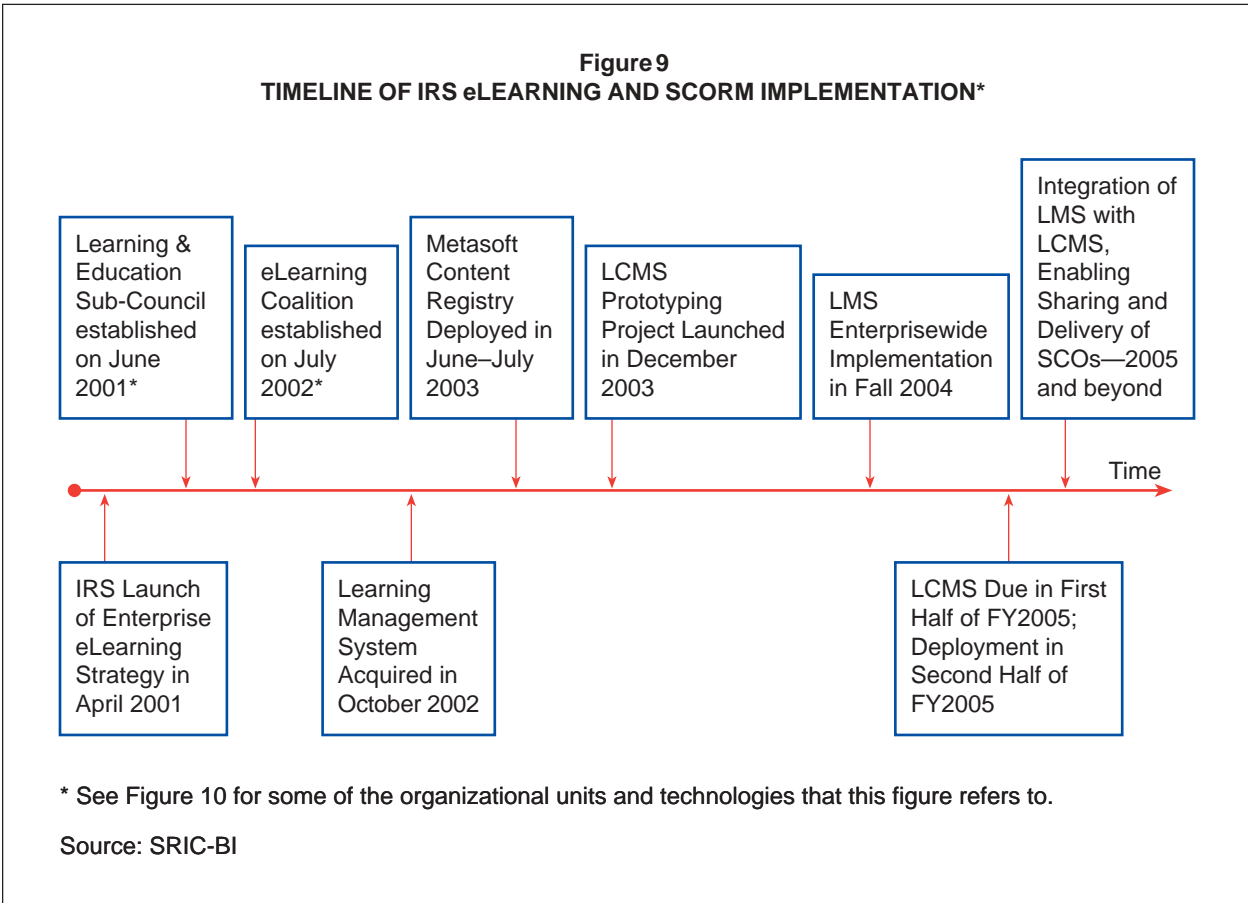
In the fall of 2000, a major IRS reorganization was complete, following Congress’s 1998 IRS Restructuring Act giving the IRS a taxpayer focus instead of its previous functional orientation (with the same tax-administration functions performed in each geographic region). At the same time, the IRS senior management recognized a need to enable the organization to meet rapidly changing business needs more flexibly and to move away from the old one-size-fits-all learning model. This need made it clear that eLearning should become an increasingly important part of the IRS learning and training strategy. Greater use of technology in the IRS’s evolving, blended learning model would also enable significant cost savings by eliminating some training-related travel costs (out of a total IRS travel budget of some \$100 million).

The IRS learning and education leadership also embraced the longer-term vision of an object-based learning approach that would enable both greater content reuse and reduced cycle time for learning-content development. As a result, the IRS decided to embrace SCORM from the start. Although it made no in-depth business case specifically for SCORM—because the organization was not ready for an enterprisewide technical discussion around SCORM and thus used a decide-and-announce approach—the IRS learning and education leadership decided that no viable alternative to SCORM existed for achieving the longer-term IRS goals and objectives.

Rather than taking an incremental approach by starting a small pilot test and then expanding it into an enterprisewide initiative, the IRS launched an Enterprise-wide e-Learning Strategy in April 2001. From the outset, the IRS enterprise eLearning strategy focused on changing workforce learning to support the achievement of mission-related outcomes directly. The eLearning strategy brought together stakeholders from all segments of the IRS to ensure success and widespread input and participation across all business units. The IRS organized project teams around major workstreams addressing issues like technology (hardware and software), content management, learning design and development, competency management, learning environment, and organizational

change. Widespread participation was particularly important because the IRS reorganization resulted in much greater decentralization, and each business unit was now accountable for effectively and efficiently meeting the needs of its customers. Communicating and sharing experiences across the organization were therefore important to ensure success of the eLearning initiative.

Figure 9 shows some of the key milestones in the IRS eLearning initiative—most of which we discuss further below—and makes it clear that a great deal of work has already happened but also that it is very much still work in progress. Some key systems, including LMS and LCMS that will affect other parts of the eLearning initiative are nearing full deployment (LMS) or are near a completed specification phase and thus moving rapidly toward system acquisition (LCMS).

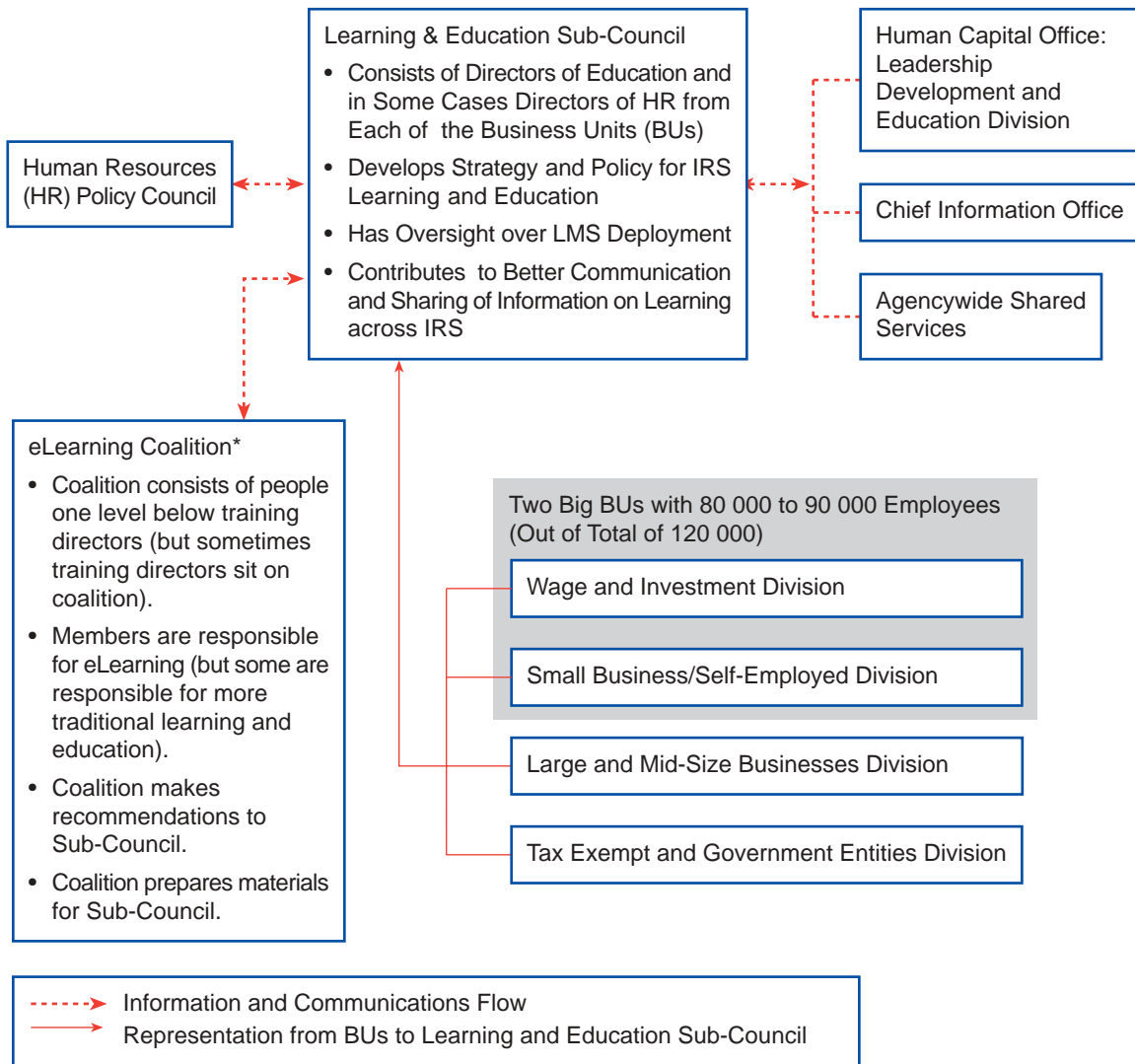


eLearning Organization, Adoption, and Experience

Because the IRS is now a decentralized organization, most of the implementation work and the cost of related projects are in the business units. However, key strategic and policy decisions take place at National Headquarters (NHQ), always with input and participation of all internal education-community stakeholders. The following four groups have played key roles in the eLearning and SCORM implementation:

- *Learning & Education Sub-Council.* As Figure 10 shows, this sub-council is where representatives from all learning and education staff of IRS meet to make strategy and policy decisions about learning and education issues. The sub-council and its members communicate with various other organizational units and with individuals in the IRS learning and education community, both in preparation for important strategic decisions and to share information and best practices around the organization.
- *eLearning Coalition.* The coalition provides important input to the sub-council and brings together eLearning professionals from different parts of the IRS to work on a variety of eLearning-related projects.
- *Leadership Development and Education Division, Human Capital Office.* This division plays a key role in the LMS implementation as well as in the prototyping of the LCMS and has been active in many other aspects of eLearning and SCORM implementation. The division is also working on competencies and competency mapping that will help guide eLearning course development.
- *Chief Information Office.* Beginning in 1995, the Web Services group developed an eLearning management system (<http://learning.irs.gov>): the “Interim LMS.” This system is still in place today as courses migrate to the Enterprise LMS. To prepare courses for the new system, technical experts in this office have worked on the Metasoft metadata registry (for registering learning content metadata to enable search and retrieval of content for reuse; see below) as well as the use of synchronous eLearning tools and collaboration technologies. The office also contains experts in Web services and XML technologies and includes key developers of the IRS templates for development and delivery of IRS eLearning content. The Web Services group worked with the Human Capital Office and the IRS business units to develop a prototype delivery of “IRS mandatory briefings.” It did not deliver this prototype of five annual employee briefings through an LMS, but through an intranet site to test the feasibility of large-scale delivery of learning content. The test was highly successful, with delivery of more than 250 000 individual impressions of the briefings within three months of their original release.

**Figure 10
ORGANIZATIONAL PERSPECTIVE ON IRS eLEARNING INITIATIVE**



* Numerous teams of work streams have contributed to the coalition; see text.

Source: SRIC-BI

A large learning and education community exists in the IRS, and a large number of people and organizations have been active in a range of eLearning and SCORM activities. This work will continue as more SCORM-conformant content is built, both internally and externally, and enters into the content repository to enable others to access and reuse it anywhere in the IRS. Deploying new eLearning technology and

implementing new content-development processes have resulted in debate, discussion, and some inevitable frustration that typically comes with change. This situation has also resulted in part from the additional work associated with the eLearning initiative on top of employees' existing workload. In this context, some people believe that one important and positive role of the sub-council and the coalition has also been to serve as a forum for people to vent their frustrations and bring them out in the open.

The IRS decentralization has made it more challenging to manage, implement, and fund enterprisewide and long-term initiatives from NHQ, because business-unit commissioners and their managers have local and immediate needs that typically have top priority. Because travel budgets are also "owned" at the business-unit level, the NHQ found major opposition to including training-related travel-cost reductions as part of the benefit calculus for the eLearning initiative.

So far in the IRS eLearning and SCORM implementation, the lessons include the following:

- *Draw on the experience and knowledge of others.* The IRS eLearning team members have interacted and communicated with ADL Co-lab staff and others (including visiting Cisco to hear about its experience with reusable learning objects) during the planning and implementation phases of the IRS eLearning initiative. But Earline Tompkins (LCMS Prototype Project Manager in the Leadership Development and Education Division) and others believe that they could have been more aggressive in seeking out other early adopters of SCORM to hear about and learn from their experiences, including visiting some early adopters in the government sector. (In preparation for its eLearning initiative some years ago, a delegation from the Bank of Montreal visited a number of companies that had considerable experience with eLearning and found these visits to be extremely valuable and useful.)
- *Anticipate road bumps that will invariably appear.* No eLearning initiative exactly follows its plan, and some contingency/scenario planning or risk analysis can be very useful. One can typically identify some potential obstacles from discussions with early adopters. One can identify other potential difficulties by carefully examining the specific operational, organizational and political realities that could affect the implementation of large eLearning projects. One could also better anticipate potential road bumps by including assessment of outside technology or content providers and what some of the risks are in working with such outside vendors.
- *Launch marketing and education campaign.* In most eLearning initiatives, additional work and cost are likely to come before significant benefits materialize. This change makes it particularly important to have an active marketing and educational campaign that explains why the initiative is important, what the benefits will be, when they will likely come, and how people in different groups and positions will be affected. Honest and frank communication about these issues will help prepare everyone.
- *Don't assume vendors to be able, willing, and knowledgeable.* One of the major surprises that the IRS encountered was the extent to which it had to educate vendors about SCORM (DCA had the same experience). Although growing numbers of eLearning vendors now claim at least to understand SCORM and have products that are

SCORM conformant, how much actual SCORM experience vendors have is important to check. (See earlier discussion of ADL's SCORM Adopter program and its requirements as well as ADL's certification process.) Careful due diligence and talking to a vendor's customers are therefore important.

- *Use rapid prototyping as part of quality control.* Organizations' interpretations of SCORM sometimes vary from those of their vendors, and this variation can result in the creation of SCOs that do not work properly. Particularly in large development projects, organizations are wise to use rapid prototyping in which vendors can quickly produce a small number of SCOs that they can test to make sure that their design is correct and works properly. Full-scale development can then begin.

Integration and Process Experience with SCORM

Even without integration with enterprise-resource-planning systems or other major enterprise-application systems, eLearning typically involves integration of various systems and technologies (as in the case of the three main components of DCA's learning environment). It also involves implementing new processes and process controls, especially on the content or course-development side. At the IRS three major systems (see Figure 11)—one of which (Metasoft content registry) is in place, one (LMS) is currently in installation, and one (LCMS) is undergoing prototyping—will need integration and will require various process changes in terms of how learning and education develop and find delivery.

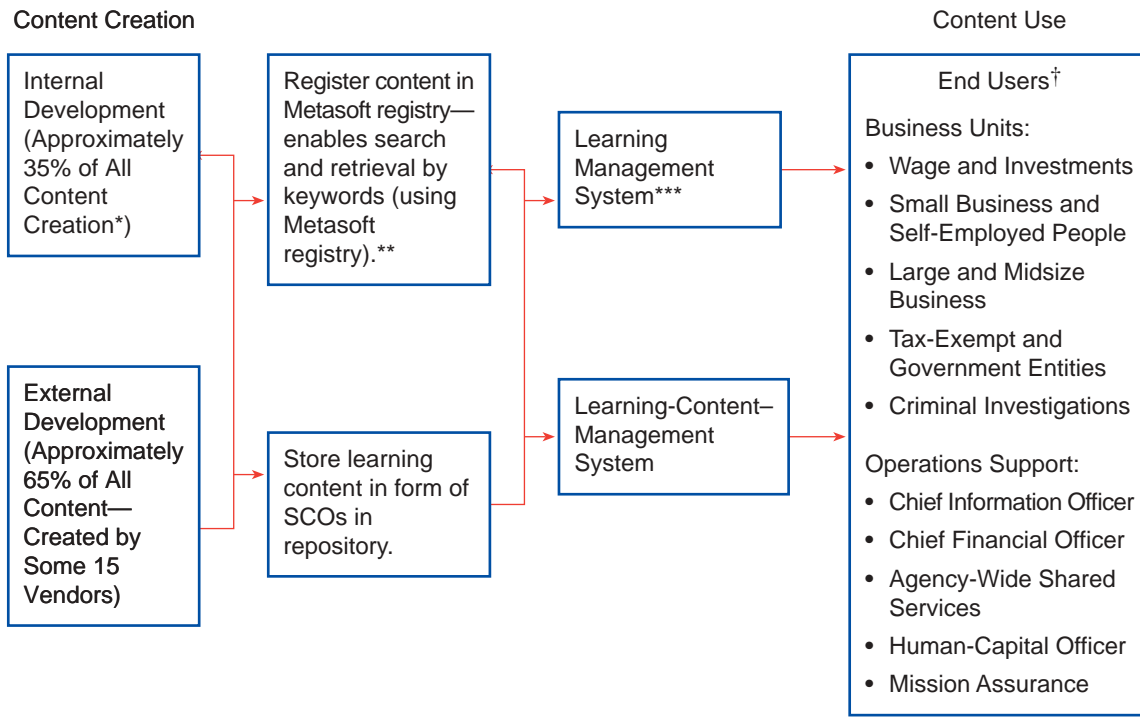
Systems, process, and integration issues and developments that have surfaced in the IRS eLearning implementation so far include:

- *Metasoft content registry and metadata repository.* The IRS eLearning team put this technology in place at a time when the IRS was struggling with inconsistent metatagging of sharable content objects for its SCORM implementation. Now, internal and external course developers have clear instructions about what tags are necessary, and they can access the Metasoft registry on the Web and input all the tags and find the registered content. This process allows other developers to go into the system to search for and find SCOs for reuse in other lessons, modules, or courses in development (SCOs equal to "topic" in the IRS, with assets at a more granular level, and aggregating up to lessons, modules, and courses in the IRS aggregation model).
- *Learning-management system.* As Figure 9 indicates, the IRS selected its LMS in October 2002, but installation is not yet complete. This long and frustrating LMS implementation is not unique to the IRS. The IRS team close to the SCORM implementation has also experienced some frustration, because it had expected greater SCORM knowledge and understanding in the LMS vendor community. This situation has improved, but many vendors' plans and strategies for dealing with SCORM 2004 are still not clear, complicating users' future planning. Overall, however, the IRS team believes that the implementation of SCORM has not been easier or more difficult than any other system implementations. Success in these types of implementations is always dependent on how well the internal and external teams work together to resolve the

inevitable technical issues that arise. The complexity of the SCORM implementation comes from trying to establish a standard with systems that are already in place and communicating new methods of doing business. Prioritization and deciding what one wants to fix now and what one wants to fix later are also important. Even though the process has been long and arduous, the IRS team expects that the payoff will come when the systems move to SCORM 2004. Additional return on investment will likely come from extending the SCORM model into the general management and reuse of all knowledge content throughout the organization. IRS is already seeing this return in the implementation of the same types of processes in performance support and enterprise-content management.

- *Learning-content-management system.* After a call for participation in the LCMS prototyping in fall 2003—and after selecting a platform as the basis for the prototype—eight project teams are now in the process of refining the functional and technical specifications for use to select a vendor in the upcoming competition for an enterprisewide LCMS. Because the new system will become a key and integral part of the overall eLearning architecture of the IRS (see Figure 11 for a high-level perspective on key elements), it will also have an important impact on many key processes, especially those involving content development and management. The “human content management system” that Figure 9 refers to will therefore also need adjustment to account for new tools and systems that will see use as the LCMS deploys. The course templates that the IRS has developed are integrable and may serve within the LCMS (25 to 30 templates exist and have now reached stability in the current version five). Although specific policies for LCMS use are still under development, one scenario is that as long as external content developers meet IRS content guidelines and specifications and provide content that is SCORM conformant and can import into the LCMS, no one will likely require that vendors must use the tools and templates of the LCMS only.
- *Metatagging systems for enterprise content.* In one possible scenario in Figure 11, users are able to tag content either in the Metasoft utility or in the LCMS metadata tagging utility and find equivalent results and are able to use Web services to communicate between the systems. This approach could provide a way for all types of content-management systems to provide a centralized portal to locate content (eventually evolving into the enterprise search engine).

Figure 11
SUMMARY VIEW OF IRS EMERGING eLEARNING AND SCORM ARCHITECTURE



* Varies significantly across business units—from significantly higher in Wages and Investment business unit to much less in Small Business and Self-Employed–People business unit.

** See text for metatagging options.

*** An internally developed legacy “interim LMS” (learning.irs.gov) is currently in place and has worked well for the past three years.

† Initially only in IRS business units, but plans are to expand to enable content delivery to IRS customers.

Source: SRIC-BI

Because external vendors are currently developing about half of IRS eLearning content, the IRS has created an external Web site with IRS policies, standards, and content specifications and resources that are useful to vendors. As the eLearning and SCORM implementation initiative has evolved, so have the knowledge and understanding both inside the IRS and in the vendor community. Early in the process, the IRS team lacked full appreciation of all the issues related to eLearning and SCORM, but it has learned much—especially in the past 18 to 24 months. As a result, the IRS team can deal better with outside vendors and make clear what they need and want—and can better understand whether vendors have the required capabilities.

Lessons in the area of integration and process associated with the IRS eLearning and SCORM deployment include:

- *Allow time for socialization to take effect.* As we discuss in the case of DCA, SCORM-based eLearning implementation involves new technologies and processes that people need time to adjust to. Behavior change does not happen overnight, and a socialization process must run its course. Yet the IRS experience has been that developers also often perceive tasks such as metatagging to be more difficult than they are; many developers have expressed surprise at how easy the actual metatagging process is to use.
- *Be early in putting in place systems to deal with content development.* Because the evolution of the eLearning industry made LMS technology available years before LCMS gained market acceptance in 2000–01, most eLearning adopters (especially *Fortune* 1000 companies) have LMS in place or are putting them in place; only a minority have LCMS that focus on the content development and management side of eLearning. The current IRS situation is similar to that of many other organizations in that an internally developed, legacy “interim LMS” exists while a new LMS is currently seeing installation (and will likely be in place when its LCMS is ready for use). Even without the LCMS in place, however, the new SCORM-based content-development processes are institutionalized in IRS. So far, Metasoft has approximately 725 registered SCOs. However, people are not yet reusing content because they are not aware of how to repurpose the content and because a full development and reuse cycle is not yet complete. Once this development and reuse cycle is complete, consistent design standards and best practices will maximize design efficiency.
- *Put right pieces in place and avoid pain.* Although few organizations will today launch new eLearning projects without an LMS in place, Claude Mathews of the IRS believes that in the ideal situation, organizations focus early on metadata schemata and deployment of an LCMS. Developing the processes to manage content is best handled by an LCMS. Instead of designing templates, databases, and development and delivery methods, the LCMS can handle it all through a user interface. This interface allows the organization and individual developers to focus on content development (what is familiar and known) rather than intensive content management (what is new and unknown). Focus is also on organization-specific content rather than generic content, which is likely to have less value to the learner and the organization. This focus in turn enables organizations to gain full value of an LMS by being able to track and administer a variety of relevant and highly valuable content that meets learners’ needs.
- *Write tight specifications for vendors.* Writing clear specifications when dealing with outside vendors will help avoid problems, and using rapid prototyping can also help. But the challenge for organizations is to be clear and very specific when they are in the early phase of their own learning curve and have little clarity about their own needs and about learning technologies and standards or specifications (of SCORM) that will form the basis for the initiative (the you-don’t-know-what-you-don’t-know syndrome). The IRS team did a great deal of homework and created various work groups that would help build expertise and allow shared experiences across the enterprise. The IRS also

built a Web site where vendors can find the latest, updated versions of all IRS course specifications and standards. The site provides information about IRS templates, ASTD course-design standards used by the IRS, and metadata requirements and processes for inputting them into the Metasoft system. At present, the IRS team believes that more, rather than less, structure and guidance for course developers is necessary. But the IRS also recognizes that it wants to provide sufficient freedom and latitude for developers to innovate and be creative in designing learning content and experiences to achieve maximum effective learning.

Future Plans and Challenges

A number of very important IRS steps have laid the technical and knowledge foundation for the next phase of the IRS's eLearning and SCORM implementation. This phase is where benefits to learners and the organization will start becoming more significant and visible and thus will also likely build greater goodwill and buy-in across the organization. The eLearning team recognizes that significant benefits already exist as a result of the eLearning initiative—including considerable cost reductions in the annual employee briefings that are now online, as well as from creating more standardized, consistent, and repeatable processes and procedures that will yield important long-term benefits. Still, the perception among many people is that the initiative has so far involved mostly costs and additional work. The benefits from content reuse and reducing cycle time for content production have yet to materialize in a significant way, and the business impact and benefits will therefore mostly become clear in this next phase.

The IRS is now in the very early part of the second phase, and users (course developers) are starting to provide feedback about the existing registered content (SCOs). The IRS team has also recognized that a complete development cycle will be necessary before all the bugs are out of the system—including design errors in the SCOs. The IRS has discovered some of these bugs in recent months, but many will not likely turn up before someone accesses the SCOs and wants to reuse them (and finds the problems when opening them up). This important learning process will take place in the early part of what Claude Mathews sees as the second phase of the SCORM implementation: learning to reuse existing content. It is also paving the way for a much easier implementation of SCORM 2004.

The following are two key milestones (and will likely also involve some new challenges) that will have a major influence on how successful the IRS eLearning and SCORM implementation initiative will be in the near- and the midterm future:

- *Build a community of practice (CoP)*. This milestone will focus on content development and use of technology in the IRS learning and education community (consisting of almost 800 people). This internal CoP should also connect with external vendors of key technologies or course-development services, so that information sharing and knowledge can flow back and forth between the internal and external communities.

- *Install and integrate the LMS and LCMS.* These steps are key in completing the key infrastructure that will enable both leveraging current SCOs and enabling easier content development and delivery and management of new content. A key challenge here will be to make sure that the handshake between the LMS and the LCMS is smooth and effective and causes no additional delays and problems. This key step in the IRS eLearning initiative will also require considerable training of both internal staff and external (content) developers. Although this training will mostly fall on IRS staff, the LCMS vendor should also be helpful and provide guidance on the basis of what its other clients have done in this regard.

Longer term, senior learning and education management of IRS has a vision similar to what previous Learning-on-Demand (LoD) program reports and bulletins have expressed about the convergence or integration of eLearning, knowledge management, and general digital-content management (including document management). One possible scenario is that Metasoft becomes a knowledge registry rather than just a SCO registry, but this change will require wider acceptance and use of metadata schemata and ontology so that content can be easily and effectively accessible. This change implies widespread use of knowledge objects (KOs) that can store in repositories and also serve for performance-support applications. These KOs could then also find application in embedded learning that integrates into workflow and a variety of business applications that people use while doing work.

Synchronous learning through the use of virtual-classroom and other technologies has gained strong support within the IRS, as it has in most other organizations. One can metatag these sessions in Metasoft and reuse them when appropriate. This procedure has already had demonstration in the IRS and will likely see growing use as the IRS integrates both Metasoft and the LCMS and uses them more widely. Other technologies—including collaboration technologies—for formal and informal learning will also likely see greater use in the future and integrate into the systems in Figure 11. This change will result in new functionality but will at the same time enable greater reuse and delivery of digital content from repositories to meet growing learning needs throughout the organization. All the above will likely take several years to implement and achieve a high comfort level among users, but thereafter the next step—already under discussion—is to extend the systems to deliver learning and knowledge content to IRS customers.

Eurocontrol

As an organization that serves 33 member countries across Europe helping to coordinate air-traffic-control (ATC) services, Eurocontrol (the European Organization for the Safety of Air Navigation) is an interesting case of SCORM-based eLearning adoption for the following reasons:

- It exemplifies the situation facing many smaller organizations in Europe where instructor-led training still dominates but where eLearning is gaining ground.

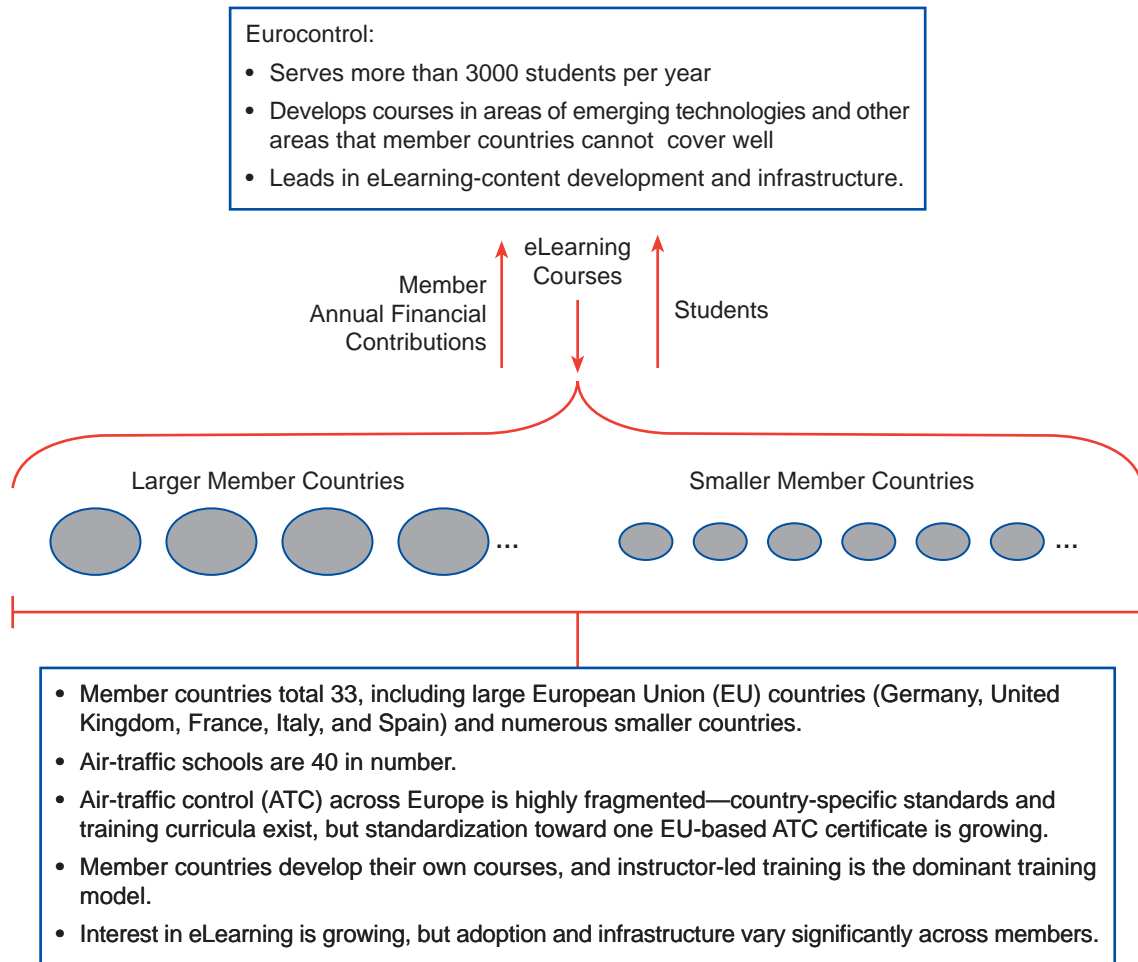
- It represents a corporate-university–like model or hub-and-spoke system, in which Eurocontrol as the hub serves its numerous members (spokes) across Europe, and it demonstrates the benefits and advantages of a collaboration-based eLearning approach. Such a model has particular appeal for serving small and medium-size enterprises that cannot financially support the investment and operating costs of its own content development and internal infrastructure (see *LoD Bulletin*, First Quarter 2002).

The evolving role of Eurocontrol vis-à-vis its member countries in the changing context of European ATC—where the arrival of a common ATC certificate in the European Union marks a major step toward greater standardization—is also interesting and may open new and expanded opportunities for Eurocontrol to serve its member countries.

Background and Context

Although more standardization and common ATC policies are emerging in Europe, fragmentation still reigns, and each Eurocontrol member country has its own training operations to meet its country-specific needs. Growing training needs are driven by new technologies as well as increasing air traffic across 66 different ATC centers serving more than 100 major airfields and more than 200 smaller ones in Eurocontrol’s member countries. As Figure 12 shows, courses available mostly via instructor-led courses provided by Eurocontrol serve some of the specialist training needs and requirements of the Eurocontrol member countries. However, the percentage of these courses delivered via eLearning courses or a combination of eLearning and instructor-led training (ILT) is increasing. These courses encompass topics and areas that member countries do not cover or cannot cover as well as Eurocontrol can, or where member countries have insufficient numbers of students to justify a course offering.

Figure 12
AIR-TRAFFIC-CONTROL TRAINING IN EUROPE



Source: SRIC-BI

Because the government of each member country makes a financial contribution (according to a complex formula) to the operations of Eurocontrol, eLearning courses or instructor-led courses that member-country students take at Eurocontrol facilities are without fees. Government funding of ATC training budgets throughout Europe has been fairly stable and has enabled member countries to continue to finance the cost of travel and accommodation for students who attend Eurocontrol courses. These training courses have therefore been in high demand by students who enjoy both the travel and the face-to-face interactions with other students.

Instructors at Eurocontrol are also wedded to their traditional instruction and are slow to welcome efforts to migrate existing courses toward eLearning—also the current reality in many corporate environments in Europe. However, growing use of eLearning as part of a blended model (as Eurocontrol is doing) and thereby allowing a gradual transition toward greater eLearning adoption is spreading in Europe as it is elsewhere.

eLearning Organization, Adoption, and Experience

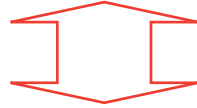
Although the organization prepared no formal business case for the eLearning initiative, as in the case of the IRS, Eurocontrol management saw that development of eLearning courses for delivery over the Internet would result in significant cost savings for member countries. Use of eLearning would also alleviate the capacity constraints of Eurocontrol for additional instructor-led classes, and thus management supported the development of eLearning courses as a way to expand capacity without building new facilities. The leadership also recognized that eLearning would enable delivery of training anywhere and anytime where Internet connections exist (broadband connections are scarce, and 28- and 56-kilobit-per-second dial-up connections continue to be a reality for learners in many Eurocontrol member countries).

Some of the large member countries have migrated toward eLearning, and Spain, the United Kingdom, Germany, and some others have built internal course-development capability as well as the infrastructure to deliver eLearning courses (in some cases, learning-management systems have developed internally, and in other cases commercial systems have been acquisitions). Most Eurocontrol member countries have little or no internal eLearning capability, however, and thus look to Eurocontrol to provide both courses and the delivery mechanism (see Figure 13).

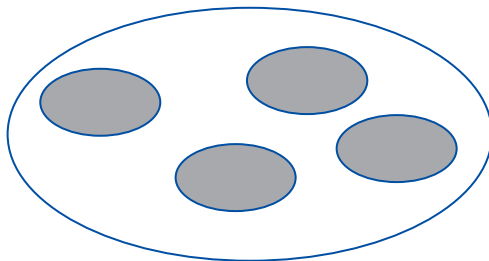
Figure 13
eLEARNING IN EUROPEAN AIR-TRAFFIC CONTROL

Eurocontrol:

- Increasingly serves as application-service provider for eLearning for member countries
- Develops leading-edge courses for member countries
- Applies advanced technology (such as simulation) to air-traffic-control training.

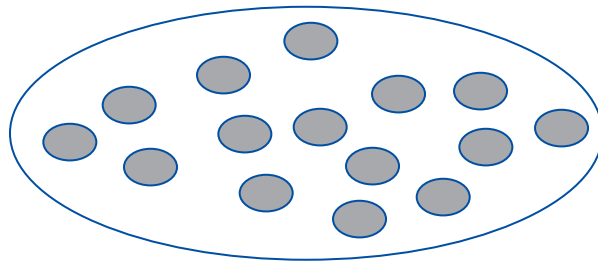


Leading eLearning Adopters



This group of early eLearning adopters and leading practitioners in eLearning for ATC is small—including Spain, Germany, the United Kingdom, and some others (but even in this group, instructor-led training is dominant training model).

Nonusers or Minimal Users of eLearning



Most Eurocontrol members fall in this group—and they rely most on Eurocontrol for training, including eLearning-based courses.

Source: SRIC-BI

Eurocontrol has more than ten years' experience with technology-based learning, beginning with computer-based training (CBT; using Toolbook and a home-built course-management system for CBT and later WebCT-based eLearning for a time) and migrating to use the Internet in 2000 but embracing this medium more fully in 2002 (using Macromedia's Dreamweaver and Flash as key tools). Most of the 80 eLearning modules, each typically some 40 minutes in length, developed during the past two years. A number of these modules—70% or so of which external developers created and built and structured as SCORM-based SCOs—typically combine to create courses. A significant number of the current eLearning modules were previously CBT-based courses. The Eurocontrol eLearning staff of four acts as internal consultants (to internal customers) and has developed standards and guidelines (and templates) for external developers. In their role as internal consultants, the staff members help train others to become self-sufficient so they can deal effectively with external developers.

Partly out of fear of being overwhelmed by surging demand for online courses if it undertook active marketing for its eLearning courses, Eurocontrol has relied mainly on word of mouth to alert users about available courses. This reliance will change for an upcoming ATC refresher course for controllers: Potentially 10 000 to 13 000 users could take the course—a good example of how eLearning allows scaling that would be difficult if classroom delivery were the only option.

Integration and Process Experience with SCORM

Eurocontrol, like the IRS, decided right from the start of its eLearning initiative in 2000 to base it on SCORM to enable interoperability with content and systems of its member countries. However, so far, most of its members, and especially the smaller ones, have been unable to embrace eLearning in an aggressive way, and few have deployed learning-management systems. Many of these members serve too few students to make an eLearning program cost-effective or see no need to develop their own eLearning capabilities if they can instead use the services and eLearning courses of Eurocontrol. Thus a strong business case exists for Eurocontrol to act as an application-service provider (where its members use its LMS).

After the selection of WBT Systems Topclass LMS in 2002—to deliver, track, and manage both eLearning courses and Eurocontrol's instructor-led classes—use of available eLearning modules has increased steadily, reaching 5700 by July 2004, up by 2000 modules in the most recent six months. A recently deployed online (voluntary) survey questionnaire that learners can complete (yielding 100 respondents in the three weeks it has been available) showed a 90% satisfaction rating for the overall learning experience. The plan of Eurocontrol is to increase the use of eLearning in a blended approach that moves certain parts of an ILT-based course online, thereby reducing the amount of time a learner must spend on travel while taking a course.

Eurocontrol has deployed a PeopleSoft enterprise-resource-planning system and has had some discussion about integrating it with the Topclass LMS. But internal training for Eurocontrol is relatively small compared to its overall training operations, and integration of these systems is therefore probably unnecessary. Another integration that has begun, however, connects the LMS with Eurocontrol's extranet. It is for 10 to 15 applications to allow for single-point sign-in for users.

According to Andrew Drain, head of the eLearning unit at the Institute of Air Navigation Services, Eurocontrol, the eLearning deployment has been relatively painless, perhaps because the organization has been slowly gaining experience and expertise in eLearning over a ten-year period. When the institute decided in 2000 to migrate to Internet-based eLearning, it did so in part because senior management believed that the internal team was well prepared to make the leap (and was in fact ahead of most other groups in Europe that it examined at the time). The policy of the eLearning team has been to avoid unnecessary complications, and this policy has served well, but has not kept the team from building some game-based learning modules that have proved to be very popular. The team built these modules internally; procuring costly game-based learning modules from external content developers is not likely to happen—at least in the near term.

Adapting its processes to meet the specifications of the SCORM reference model has been painless, according to Drain, because both internal and external course developers have followed methodologies and met provided specifications and used the templates that Eurocontrol designed. But this process has also been simple because a metadata taxonomy has not yet developed—in part because content reuse (either at asset or at SCO level, as we see in the IRS case) has not been a goal of Eurocontrol. This lack is at least partly a result of its relatively small operation (with a total training staff of 80, only a small part of which will be active with eLearning in the next few years, versus a total learning staff of 800 at the IRS).

Although discussions have taken place about content repositories that would enable sharing of content—seemingly a good idea to avoid redundancy and reinventing the wheel among all 33 member countries—this vision has been much more difficult to realize than anyone initially hoped. Currently, an asset repository contains only 150 objects—and Drain believes that a total of perhaps 3000 would be necessary before users would see significant value. This asset library has not yet launched officially because it is still experimental. A major project to encourage use should start in 2005. The problems of sharing assets in the commercial environment that is starting to exist probably mean that the only contributor to the repository will be Eurocontrol, so a major effort will be necessary to populate it.

Future Plans and Challenges

Eurocontrol has come a long way with eLearning in a short time—given both what a small staff has accomplished in terms of number of eLearning modules and the role that Eurocontrol is playing as an eLearning advisor and tool developer (including for some simulation tools for ATC training now under development) for its member countries. Some member countries that previously had very little interaction with the eLearning staff of Eurocontrol are now in regular dialogue to discuss eLearning tools, operations, and strategies. As ATC certification standards in Europe reduce the need for a high degree of localization of curricula (which has been a requirement up to now), Eurocontrol will be in an increasingly advantageous position because it can then develop courses that can serve (without modification) a larger number of people across the 33 member countries.

As member countries increasingly recognize the ASP option for eLearning delivery (demonstrated recently by Sweden's expressed interest in this option) and as financial realities likely make travel and two- or three-week classroom-based courses financially difficult, Eurocontrol is likely to see growing demand for eLearning courses from its member countries. This increase implies more demand coming from the larger member countries and not just from the smaller countries that today rely very much on Eurocontrol for their training.

Because development has been rapid in the past few years, Drain believes that a “consolidation phase” is now likely before new and bold initiatives again may emerge. But some of the functionality that will likely be a part of future eLearning courses is already in the works, because intelligent simulation systems are now under development that will generate much greater information about and analysis of student actions and performance during simulation-based learning activities in a Web environment. This

development will enable greater feedback to students, and the simulations will also likely enable more efficient use of instructor resources.

Because simulations and game-based learning (already in use for aircraft recognition, for instance) have proved so popular and effective among ATC staff, we will likely see interesting developments on this front. This fact is also recognized by the SCORM community (see **THE FUTURE OF SCORM**) and aligns with its need to focus more on learning design that goes beyond technical infrastructure and tool specifications and standards.

On the content-repository front, Eurocontrol is about to put in place a document-management system from Hummingbird, and when a taxonomy that is currently in process is complete, it will enable more effective search of tagged documents. A project may also start next year to develop a European repository of ATC-related content. These developments also align with IRS plans for a “knowledge repository” (extending its Metasoft registry) and reveal growing efforts to find and use existing content better for learning and other knowledge-related activities.

MedBiquitous

The previous three case studies described and analyzed SCORM-based eLearning implementations that are well under way, even though neither DCA nor IRS has yet “gone live” with all components of its learning environments. This final case study examines two organizations—the International Virtual Medical School (IVIMEDS) and MedBiquitous—that are not far along on the eLearning deployment curve. Both operate more on the leading edge of eLearning development and have ambitious plans to help enable and deploy next-generation eLearning in medical education and health care. They plan to reach their goals in part by leveraging SCORM and other eLearning specifications and standards and developing new, domain-specific standards specifically necessary in medicine. Both also hope to take advantage of new pedagogical approaches, including greater use of outcome-based learning and evaluation and collaborative strategies to achieve advanced eLearning in medicine and health care (see Table 3 for a summary description of the two organizations).

Given the nature of the work and the wide range of organizations in these collaborative efforts, success or the timeline for goals achievement is uncertain. But even if one or both of the organizations fail to achieve some of their goals, significant value will nevertheless likely result from the work that they will do and from the lessons that these two not-for-profit, consortium-based organizations will likely learn. These lessons will be useful to future eLearning implementations in both academic and industrial/commercial environments.

**Table 3
SUMMARY DESCRIPTION OF MEDBIQUITOUS AND IVIMEDS**

	MedBiquitous	IVIMEDS
Date of Establishment	<ul style="list-style-type: none"> • May 2001 	<ul style="list-style-type: none"> • February 2003
Goals	<ul style="list-style-type: none"> • Develop information technology and standards for medical education and publications to enable integration and leverage of disparate medical knowledge repositories 	<ul style="list-style-type: none"> • Develop full potential of eLearning across the continuum of medical education through use of reusable learning objects and virtual practices and patients
Participants	<ul style="list-style-type: none"> • Medical organizations, corporations, and universities (mostly in the United States; see Table 4) 	<ul style="list-style-type: none"> • 48 organizations—mostly universities (medical schools) from Europe but also from the United States and Asia (see Table 5)
Strengths	<ul style="list-style-type: none"> • Strong representation by many leading professional medical societies • Alignment with complementary initiatives of other organizations in the medical standards and specifications area 	<ul style="list-style-type: none"> • Significant learning resources that partners and members can leverage to build learning-object repositories • Strong management and board membership
Current Status	<ul style="list-style-type: none"> • Has member profile (as XML [Extensible Markup Language] schema and specification), name schema, and activity report for membership-management working group, education working group, journal working group, and content-management working group • Has made progress on MEDBIQ-SCORM, whose objective is to customize SCORM's learning-object metadata to address the needs of health-care educators and learners 	<ul style="list-style-type: none"> • Has moved beyond proof-of-concept stage and is now testing LCMS and repository technologies (among others) for creating and managing SCORM-conformant learning objects • Is in discussion with partners and members about a range of tactical and strategic issues—including many business-model issues (see text)
Challenges	<ul style="list-style-type: none"> • Gaining international support and participation • Establishing internationally accepted standards 	<ul style="list-style-type: none"> • Finding balance and acceptable trade-offs among different partner needs and agendas • Demonstrating workable and flexible technology solutions that will appeal to both course developers and learners
Timeline	<ul style="list-style-type: none"> • Uncertain, because standards-and-specifications working groups' progress is hard to predict 	<ul style="list-style-type: none"> • Uncertain, because when key challenges will find resolution is unknown
Source: SRIC-BI		

Now in the fourth year since its launch, MedBiquitous has the support of a large number of players that would see significant benefits from the work that it is doing. As Table 4 shows, a large number of major U.S. medical and health professional associations, pharmaceuticals companies, and others have joined the organization, paying from \$5000 to \$50 000 per year, depending on the type of membership category they fall into. MedBiquitous emerged out of discussions in late 2000 with more than 20 medical associations, under the leadership of Peter Greene, associate dean for Emerging Technologies, Johns Hopkins Medicine, and executive director of MedBiquitous. Dr. Greene is also a leading figure in CTSNet.org, a leading collaborative initiative of major cardiothoracic organizations to provide a comprehensive Web-based repository of resources and information for surgeons. MedBiquitous hopes to create the enabling standards and technologies for connecting and integrating the learning resources of large numbers of medical professional organizations around the world.

Table 4
SELECTED MEDBIQUITOUS MEMBERS

- | | |
|--|------------------------------|
| • American Academy of Family Physicians | • AstraZeneca |
| • American Academy of Ophthalmology | • Aventis |
| • American Academy of Otolaryngology—
Head and Neck Surgery | • Johnson & Johnson |
| • American Academy of Pediatrics | • Pfizer |
| • American College of Surgeons | • Elsevier Science |
| • Society of Vascular Surgery | • John Wiley & Sons |
| • European Association of Cardio-thoracic
Surgery | • Accelera |
| | • Outstart |
| | • TMA Resources |
| | • Carnegie Mellon University |

Source: MedBiquitous

Scope and Focus

Not unlike professionals in other industries, medical and health-care professionals have to navigate a sea of highly distributed and fragmented learning resources, most of which no one can currently access, integrate, and use cost-effectively because of a lack of a common language and standards. According to Dr. Greene, the consortium intends to tackle the problem of learning-resource integration by serving the role of a nonprofit,

standards-development organization to promote professional competence, collaboration, and better patient care in medical and health care. The XML-based standards that it will develop will find application in:

- Medical education and training
- Medical professional-competence assessment, certification, and licensure
- Medical professional and scientific publications
- Medical professional online communities and portals (such as that of CTSNet.org).

Because the medical and health industry consists of a very large number of fields and specialties and a wide range of operating practices, the scope of the MedBiquitous undertaking of developing a technology blueprint for medical education is very broad. But the organization's focus will be on standards, specifications, and Web-services-based applications that will enable easier discovery of, access to, and use of learning resources across a wide range of medical and health-care fields. Standards will also facilitate communication and sharing information among certification boards and authorities.

Solution Components

A key part of the work of MedBiquitous is to build on, leverage, and extend what the Healthcare Informatics Standards Board of the American National Standards Institute, IMS, and ADL Co-lab have already done with eLearning specifications and standards. Both SCORM and IMS Learning Object Metadata (LOM) are extensible, and MedBiquitous will need to create and maintain a scheme and metadata that will provide the foundation for the common language that MedBiquitous is seeking. This work is well under way in the education working group of MedBiquitous in developing medical learning-object metadata. According to the consortium, this common language will enable educators to “indicate a module's subject using a medical terminology, tie modules to objectives or competencies within a medical curricula, disclose financial relationships of module authors upfront, and indicate the number of CME [Continuing Medical Education] credits awarded per module.” This scenario requires extensions and customization for medicine and health care of SCORM's learning-object metadata.

Two key pieces of the puzzle that MedBiquitous has been working on follow (also see Table 3 for brief note on MedBiquitous working groups):

- *XML-based vocabulary and metadata standard.* A content-management working group is developing elements necessary to describe content (with an agreed-upon medical vocabulary) and to enable fast and efficient content discovery. This work will leverage policies that the U.S. Department of Health and Human Services put in place during 2003 for federal agencies to use the Systemized Nomenclature of Medicine—Clinical Terms (SNOMED-CT). The U.S. government will incorporate the common clinical terminology into its information systems to facilitate exchange of health-care information electronically. MedBiquitous will have a role in learning and education analogous to the role that HL7 (see <http://www.hl7.org>) is playing in enabling interoperability between health-care information systems.

- *Web-services registry.* MedBiquitous's future vision includes a wide range of educational and learning offerings from large numbers of players serving the medical and health industry. These offerings will take the form of Web services that are easy to describe, discover, and access because XML-based vocabulary and metadata are in place.

Road Ahead

Because MedBiquitous is building on the eLearning standards–related work done by various other standards organizations and by establishing formal collaboration agreements with these organizations (such as the Memorandum of Understanding with ADL), the consortium was able to gain a running start in its work to achieve its goals. MedBiquitous is also drawing on work by others active in SNOMED-CT, and it can build on and learn from what CTSNet.org and similar professional societies have accomplished (CTSNet.org hosts Web sites for participating organizations and gives them access to Web-authoring tools and a common database).

Working with a large number of medical organizations and companies (including the learning-content–management systems developer Outstart) that have different needs, perspectives, traditions, and organizational cultures may be challenging—as other standards organizations have found out. Creating international understanding of the vision and operations of the consortium and gaining support and buy-in by international organizations beyond the small international participation that currently exists will add to the challenges facing MedBiquitous. If IVIMEDS is successful, however, and continues to work closely with MedBiquitous, this collaboration can help gain European support for MedBiquitous, which in turn is likely to result in more Asian medical and health-care organizations' also wanting to join.

To predict the timing and the details of how the growth scenario for MedBiquitous will evolve is difficult. But the current uncertainty in part explains why no firm timeline exists for what to achieve and at what date, in the next few years, even though the organization has been developing plans for the short-, medium-, and long-term future. At this point, these plans are not public.

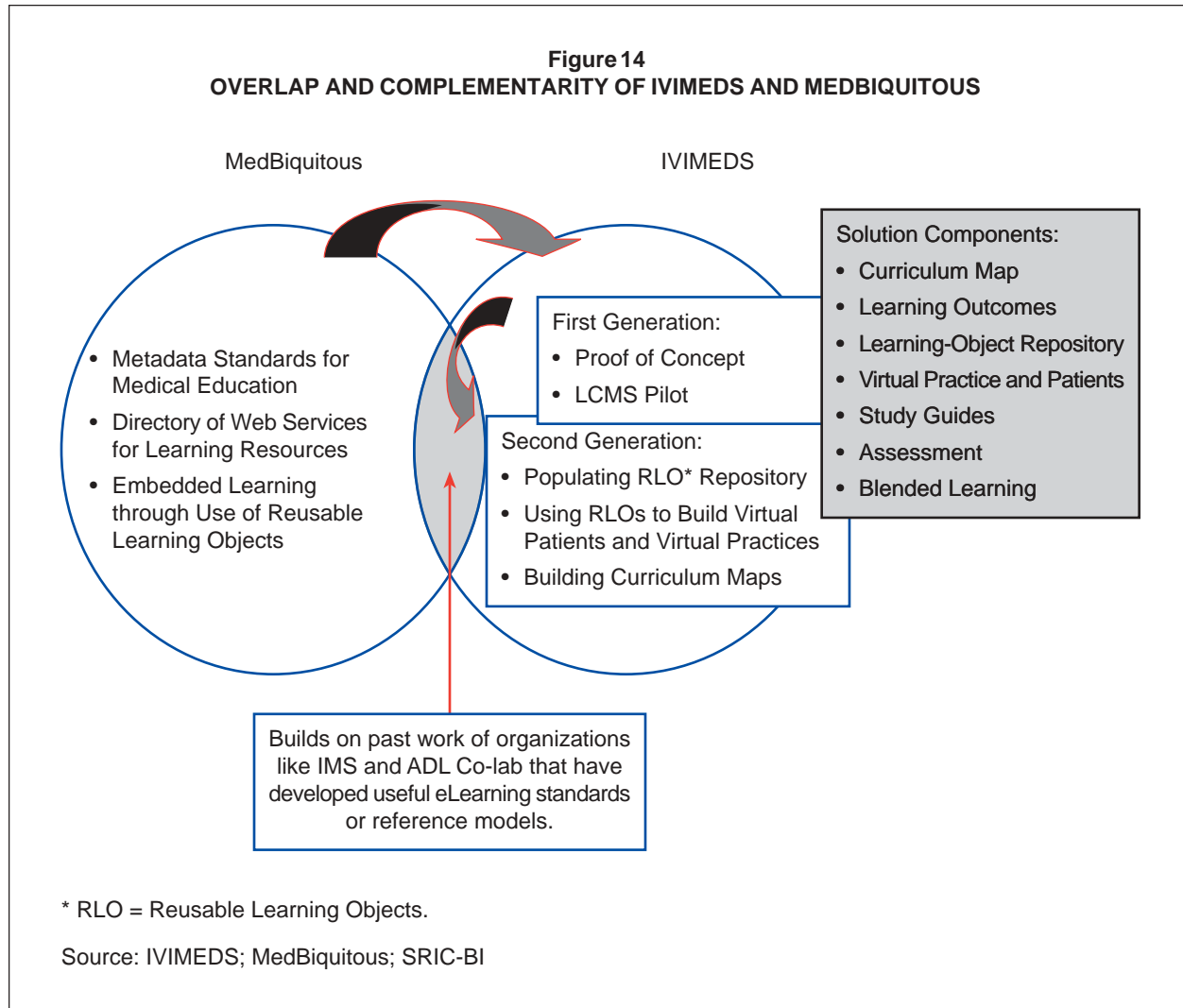
IVIMEDS

The vision and goals of this Scotland-based organization established in early 2004 (resulting from meetings and discussions several years earlier) are similar and complementary to those of MedBiquitous. Both organizations recognize that technology and standards can and will play a much greater role in medical training in the future, and both IVIMEDS and MedBiquitous want to help contribute to accelerating and expanding the adoption of eLearning in medicine and health care.

Scope and Focus

A key goal of IVIMEDS is to create a repository of reusable learning objects (RLOs) or a federated set of repositories that its members can contribute to and use. The organization plans to develop curriculum maps and virtual practices and virtual patients (built and

rebuilt or modified with RLOs). The efforts of MedBiquitous in creating new eLearning standards for medical education and learning will help enable many of the applications that IVIMEDS is focusing on (see Figure 14).



IVIMEDS focuses primarily on formal medical education (including continuous medical education and lifelong learning), whereas MedBiquitous has a broader target that includes informal learning and use of a wide range of Web-based resources and information of use for learning. One can also deduce the difference in scope and focus between IVIMEDS and MedBiquitous from the different types of members of the two organizations. As Table 5 shows, IVIMEDS consists primarily of universities and medical schools from around the world (mostly from Europe, but also with participation from the United States and the Asia-Pacific region). MedBiquitous, by contrast, has a more diversified membership but with strong participation by professional medical societies and associations and a number of pharmaceuticals companies.

**Table 5
SELECTED IVIMEDS MEMBERS***

Partner Organizations

- Ben Gurion University, Israel
- Brown University, United States
- Hull/York Medical School, England
- IVIMEDS Catalan Group, Spain
- NHS Education for Scotland
- National University of Singapore
- Royal College of Surgeons of Ireland
- Università Cattolica del Sacro Cuore, Italy
- University of Dublin, Trinity College, Ireland
- University of Aberdeen, England
- University of Birmingham, England

Associate Organizations

- Association for Medical Education in Europe
- International Federal of Medical Students' Associations

Network Members:

- University of Auckland, New Zealand
- Emory University School of Medicine, United States
- Robert Wood Johnson Medical School, United States
- University of Wales
- University of Western Australia
- University of Manchester, England

* IVIMEDS has 32 partner schools, 2 associate organizations, and 14 network members.

Source: IVIMEDS

Solution Components

Figure 14 shows that IVIMEDS has identified seven key elements as critical for achieving its goals of bringing about next-generation medical education. A key part of its eLearning architecture is a repository of RLOs that it will use to create virtual practices and virtual patients. This scenario will consist of converted and reformatted content that its members already have, as well as newly created content. These RLOs will provide a way effectively and efficiently to create new and realistic learning scenarios in which learners can engage in simulated patient diagnostics and treatments and gain immediate feedback.

Creating an advanced, technology-based model for medical education like IVIMEDS has done is of little use, however, if member institutions don't have the people or the technology infrastructure to execute the processes necessary to realize the IVIMEDS vision. According to IVIMEDS, fewer than 50% of the IVIMEDS partner institutions use commercial course-management systems (such as WebCT or Blackboard), and most have home-grown virtual-learning environments. Technology platforms are improving, however, and universities' greater adoption of the open-source course-management systems such as Sakai (see <http://www.sakaiproject.org/>) holds the potential for providing new capabilities with greater flexibility (for customization as a result of access to the source code) and lower cost.

To test further components of the learning environment that were parts of its proof of concept, IVIMEDS contracted with Giunti Labs in the fall of 2003 to provide its learning-content-management system, Learn Exact (IVIMEDS has also contracted with Intrallect of Scotland to supply a learning-object repository). In early 2004, the Giunti platform was in place to allow for authoring and management of learning-object-based content and to store and access learning objects in Learn Exact's repository. These capabilities of Learn Exact can be available as a hosted solution. It enables IVIMEDS partner schools to leapfrog quickly in terms of eLearning capability, as long as they have the necessary network infrastructure. No decision yet exists about what will be the components of the IVIMEDS technology architecture, but indications are that an important goal is to build a highly flexible system. This system would give partner schools a choice of using certain components from their own learning platforms and other components from the IVIMEDS environment. Web services may play an important part in such a flexible architecture.

A key part of the IVIMEDS initiative is to ensure that people processes are in place that will be necessary to take advantage of the new technological capabilities of the IVIMEDS environment. Technology and standards are only enabling factors, and creating new pedagogical approaches that will appeal to users (in terms of ease of use and offering new capabilities) will be the key to success.

Road Ahead

Like MedBiquitous, IVIMEDS faces a number of challenges in the next few years. Their resolution will determine how well IVIMEDS will succeed in meeting its ambitious goals. Some of the key issues follow:

- *Business model and intellectual-property rights.* Many questions remain about the (commercial) terms underlying contributions and use of content, because some organizations are likely to be net contributors; others will be net users. Other issues relate to what the terms and conditions will be for the use of the Learn Exact technology platform (and different functionalities of this platform) and other components of the total IVIMEDS learning environment.
- *Digital-rights-management system.* Even when agreement exists about what the commercial terms of content exchange should be (and how these terms will vary between partners, associated organizations, and network members), the IVIMEDS partners must also come to agreement about what technology to use to track and manage the content exchange.
- *Active participation and expanding membership.* Partners and members must put in place both the soft (people) and hard (technology) infrastructure and also create the right incentives and culture that will result in high use of the new systems and processes that are now being built. Lack of sufficient attention to people issues often undermines otherwise well-meaning and well-designed initiatives.

THE FUTURE OF SCORM

If the trends in **SCORM Adoption** persist and use and adoption of SCORM perhaps accelerate as the tipping-point principle comes into play and adoption spreads across the segments of Figure 3 (in the United States and in other countries), the pressure to add new functionality will increase. But if adoption accelerates and more partners join and contribute resources and implementation experiences, the collective capability of the ADL community to enhance SCORM beyond where it is now will increase. Growing adoption within DoD and other U.S. government departments and agencies—within or beyond the federal government—will also increase the likelihood of more budgetary resources to support the enhancement of SCORM.

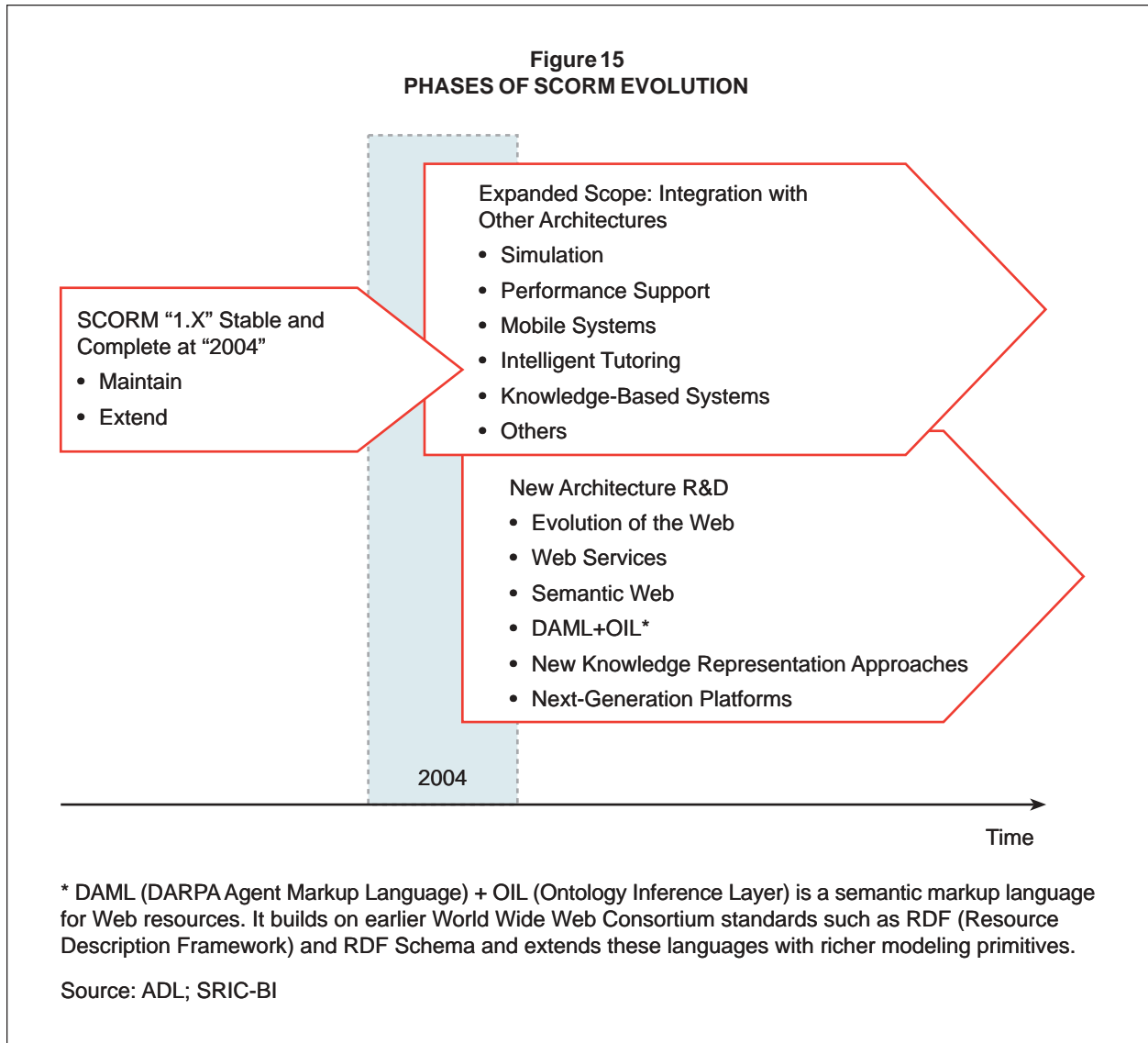
The ADL staff and its partners are already working on facilitating the migration from SCORM 1.2 to SCORM 2004 by developing tools to assist content conversion. These tools include content packaging converter (for manifests—an XML file that describes the components of a content package that the LMS imports), SCO wrappers, metadata converter, and sequence-rule examples. Tool developers will also likely build new and better tools that help facilitate the migration to SCORM 2004 if the demand for such tools grows as increasing numbers of organizations embrace SCORM 2004.

Key areas of ADL's future direction follow:

- *Continuing commitment by ADL sponsors.* Growing federal deficits and large and growing budgetary requirements driven by the war in Iraq have made it difficult to find funding for other needs across DoD, but ADL has still found the resources it needed. As U.S. military involvement in Iraq decreases, funding for initiatives like those of ADL should be less constrained, but other departments could also possibly step up their involvement and support as they embrace SCORM to a larger degree.
- *Stabilization around SCORM 2004 and planning the next generation.* The sequencing feature of SCORM 2004 that enables predictable, consistent ordering and delivery of learning activities in an instructionally meaningful manner, regardless of the delivery environment, is an important addition to the latest version of SCORM. One of the resulting benefits is that code for sequencing learning resources no longer needs to be embedded within learning resources, reducing coupling and increasing reusability (which our case studies indicate is a feature that many organizations are seeking).
- *Registration of objects and repositories.* The ability to find the right objects, either in raw assets or in SCO assembly, is a key to reusability. As we saw in the IVIMEDS case study, large repositories of reusable learning objects is a key feature of its architecture, and the consortium is now testing out an independent repository (from the Scottish firm Intrallect that specializes in content repositories) as well as repositories embedded in the LCMS. Longer term, we will likely see use of federated repositories, and Digital Concepts (which provides Metasoft for the IRS eLearning project) and others are preparing for this future scenario.
- *Integration with other technologies.* Integration—either between elements of the learning platform (as we discuss for authoring tools, the LMS, and the LCMS in the DCA case, for instance) or between learning systems and other enterprise systems

(such as the enterprise-resource-planning system)—is a key to gaining the full benefits by leveraging data across systems. Integration will also allow better tracking and data capture to help calculate return on investment for SCORM-based eLearning projects, for instance.

The ADL Co-lab teams and partners have numerous other long-term issues that need attention if they want SCORM to enable the kinds of learning experiences that we discuss earlier. Figure 15 shows some of these areas of priority to ADL.



Expanding the scope of SCORM by integrating with the technology architectures in Figure 15 would strengthen the appeal of SCORM. Our case-study interviews and other discussions show strong interest for performance support, for example, and

simulations is another area that is gaining use in many sectors (see <http://www.emergentlearningforum.com/meetings/2004/april/index.html>). Mobile learning is another area of growing interest that can also support and enable performance support for a mobile workforce. It is receiving attention at ADL's Academic Co-lab (see <http://www.academiccolab.org/initiatives/mllearning.html>) as well as in a large research project, Mobilelearn, in the European Union (see <http://www.mobilelearn.org>). The technologies in Figure 15 will likely see growing attention, but integrating SCORM with these architectures will take years. Organizations like the eLearning Industry Group in Europe would like to see SCORM address other areas and issues that they believe would increase the appeal and usefulness of SCORM in the future (see Table 6). No shortage exists of issues and technologies to tackle, but significant resources and time would be necessary. Extending the ADL network and adding new partners in Europe and Asia would be one way to expand the current scope of SCORM greatly.

Some critics of SCORM believe that key objectives of learning standards should be simplicity and economy and that SCORM is already too complex and difficult to implement. Expanding the scope of SCORM into the areas above raises concerns about finding an optimal balance between new and desirable functionality of SCORM while keeping use and implementation easy and simple—and as low cost as possible. New tools are already emerging in authoring and managing learning content (in the form of learning objects) that help simplify many of the processes in SCORM implementation. An expanding knowledge base of implementation experiences will benefit anyone planning or starting SCORM-based eLearning projects—and ADL and its partners will play a key role in sharing this knowledge and making it as easily accessible as possible.

Table 6
ISSUES THAT THE eLEARNING INDUSTRY GROUP BELIEVES THAT SCORM SHOULD ADDRESS

- | | |
|--|--|
| <ul style="list-style-type: none"> • Definition of reusable learning objects • Development of new approaches for content development • Design of new approaches to assessment • Development of models for sequencing of content • Development of models for collaborative learning • Development of new models for digital-rights management • Discourse and knowledge acquisitions • Integration of the remaining standards to support open knowledge systems | <ul style="list-style-type: none"> • Development of service-based transactions in digital systems • Development of models of contract and trust • Agreement about a vocabulary for eLearning systems • The role of rich media in building knowledge • Development of a taxonomy to structure the domain of learning • Definition of the semantics associated with learning systems • Development of a conceptual framework for representing knowledge |
|--|--|

Source: *Developing eLearning Communities in the EU*; eLearning Industry Group

The full success of SCORM will be clear only when organizations and learners are happy with the results of SCORM-based eLearning programs—in terms of both performance-improvement impact and cost-effectiveness of these programs. Achieving this end will require greater attention to learning design or learning outcomes, which IVIMEDS intends to focus considerable attention on as part of its initiative. Technology, systems, and learning platforms will continue to evolve and improve. Many of the items in Figure 15 will no doubt enable better learning experiences, and they must become a focus of attention. ADL may also need additional focus in sharing implementation experiences and running more workshops to assist organizations with new and unexpected issues that always emerge during deployments.

The vision of the IVIMEDS consortium illustrates what it can accomplish in next-generation SCORM and what the implications would be for learners, developers, and technology and service providers. The consortium is considering basing its initiative on an architecture built around Web services as a way to provide a high degree of flexibility for each of its participating institutions. Doing so would allow each school to leverage its own systems or access service components and needed functionality (in areas of assessment/evaluation/testing or intelligent tutoring, for example) that would complement its own system components. Course developers in each of the medical schools participating in the IVIMEDS consortium would be able to access learning objects (which would be easy to discover and access because of the use of MEDBIQ-SCORM metadata) from a wide range of distributed (federated) content repositories to reuse content. A service-based, digital-rights-management system would ensure compensation for content developers for use of what they have created. They would use content to create customized, engaging online learning experiences in the form of simulations and scenarios through the use of virtual experiences and virtual patients.

A dynamic sequencing and tracking capability would also enable users to personalize and assess the learning experience in real time and adjust to changes in the learner's profile, the learning context, and the actions during the learning process. Delivering a personalized learning experience that could provide performance support by embedding it in an actual work process and accessing it on a portable device would represent another example of a highly useful type of next-generation online learning that would have strong appeal to mobile workers.

Because the kinds of technologies and approaches in Figure 15 and in Table 4 enable better and more satisfying online learning experiences, one must pay attention to how these emerging systems connect with other existing systems and databases. Today's reality is that much work remains in terms of connecting components of the overall learning platform and connecting these components to other enterprise systems—to enable better data capture and linking to HR databases, for instance. Here is where Web services could come into play and potentially enable easier and more flexible approaches to integrating systems. As the IVIMEDS example shows, Web services also may enable functions and capabilities that are currently bundled together in authoring, LMS, LCMS, or collaboration systems, for instance, to be available on a more disaggregated service basis and therefore offer organizations much greater flexibility and, potentially, much more cost-effective solutions.

If SCORM continues to see growing interest and adoption and if next-generation SCORM expands its scope into the areas above, technology and service providers will likely also embrace SCORM to a higher degree than they have so far. Although a growing number of vendors now have SCORM-conformant tools and technologies, as evident in the more than 70 vendors listing SCORM-conformant LMS or LCMS (many of which are from Europe and Asia) at the ADL Web site, many others have been slow or reluctant to embrace SCORM. Expanding the scope of SCORM not only will make it more interesting and valuable for users and learners but also will make it more attractive to technology and service providers—and give them more latitude in demonstrating competitive advantage through unique solutions (that are still SCORM conformant). If the U.S. DoD and other government departments and agencies require, or show strong preference for, SCORM-conformant technologies and content, such a scenario will further drive greater vendor interest and support for SCORM.

RECOMMENDATIONS AND ACTION STEPS

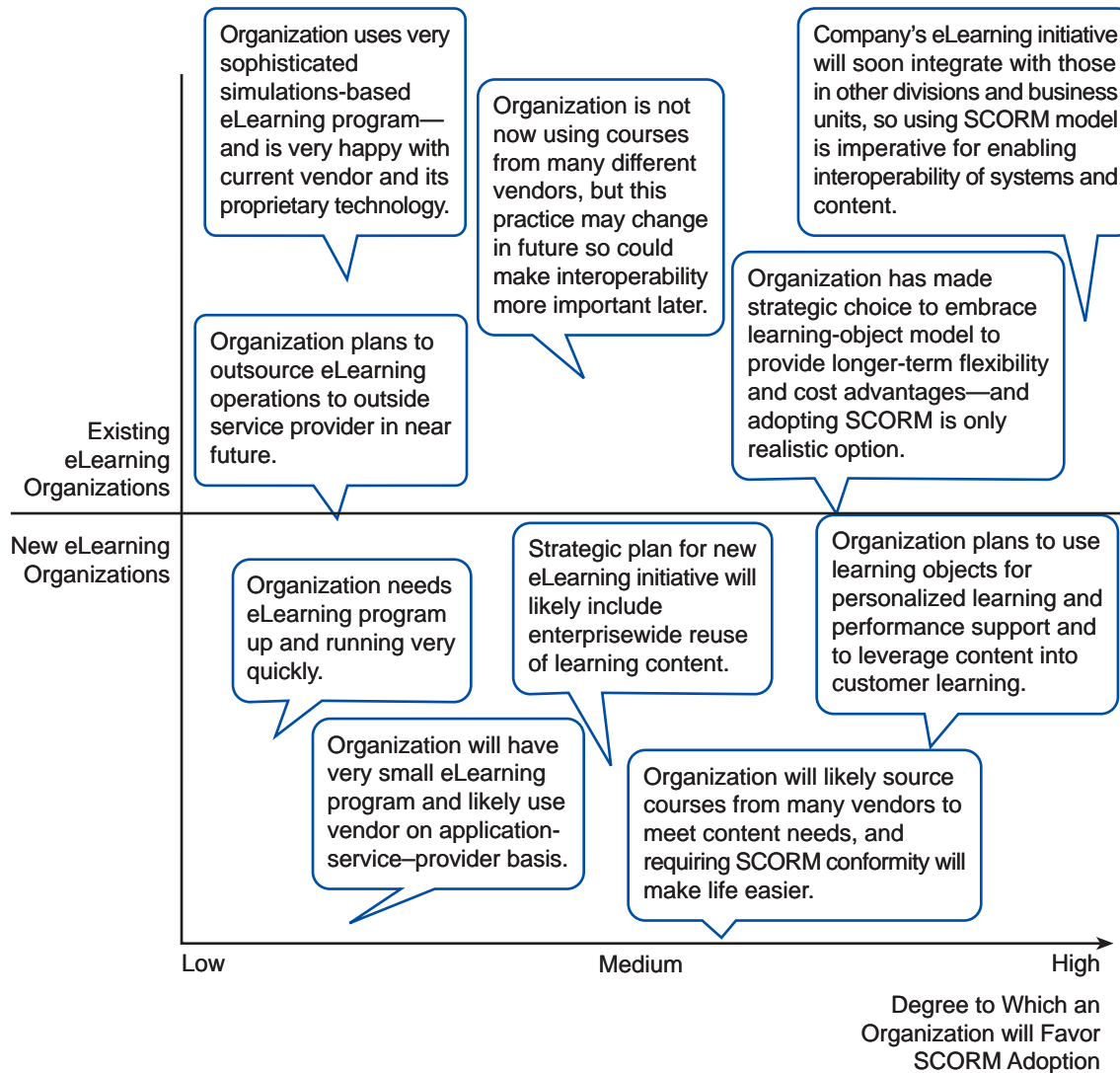
According to Wayne Hodgins, a learning futurist and visionary at Autodesk and longtime advocate of learning standards and learning-object-based approaches, we are now moving from anytime, anywhere learning to the “right” and personalized learning that is accessible and deliverable anytime and anywhere. Wayne refers to this learning as “me-learning” that dynamically adjusts for context, personal profile, needs, access device, and other key parameters that one should take into account for learning to be most effective and satisfying. Use of open standards and the object-based learning approach that SCORM embodies will enable such learning and achievement of other benefits that SCORM makes possible.

As eLearning initiatives in the government sector continue to increase in number and size, we expect SCORM adoption to keep increasing—particularly in the defense sector because SCORM has gained strong support in the military services in the United States and in a growing number of other countries. Still, SCORM adopters (either as organizations or as individuals) constitute a minority of all eLearning adopters today, and that fact is unlikely to change dramatically in the near term, even as eLearning and SCORM adoption gain ground in both business and education. Nevertheless, SCORM is gaining visibility and recognition across all sectors as more organizations embrace it when they either initiate or expand their eLearning initiatives. We also expect growing numbers of eLearning technology and content providers to embrace SCORM as they see it increasingly becoming a prerequisite for competing successfully for projects in the government sector and in industry and academia as well.

Users

What conditions or characteristics of organizations and their current and future learning operations will significantly influence decisions to embrace, or not embrace, SCORM for eLearning initiatives? Figure 16 presents a number of examples of factors that will likely influence these decisions.

Figure 16
FACTORS DRIVING SCORM ADOPTION



Source: SRIC-BI

A decision about SCORM will be affected by a large number of issues and questions that emerge in the planning of an eLearning initiative. Figure 16 illustrates some of them; others are in the box on page 59. Particularly large organizations that need to make important strategic decisions about whether to embrace SCORM may want to expand greatly the list of issues and questions in the box, including ones that are specific to their own situation and operations. Calculating an average, weighted score (using weights that reflect the relative importance of each category and factor in the box) will provide a way to take a number of factors into consideration as a quantitative decision-support tool.

ISSUES AND QUESTIONS ABOUT SCORM ADOPTION

Organization and Governance

- Does senior management recognize the importance of learning? Does it play an active role in strategic planning? Is it willing to make necessary investments that will pay off in the longer run?
- Can a company readily establish organizational units and have success in educating everyone in the organization about eLearning to gain widespread participation in the initiative?
- What is the degree of organizational decentralization, and how might it affect support and resources necessary for the learning initiative?

Technology

- Will requiring SCORM (sharable content object reference model) conformity for elements of a technology platform (including authoring tools, learning-management systems, and learning-content-management systems) provide significantly greater flexibility for the organization (by not becoming too tied to the proprietary technology of a single vendor)?
- What effort will be necessary (in time and cost) for changes in the existing learning infrastructure from embracing SCORM?
- Can SCORM certification can be a useful screening criterion? And will it make technology evaluation and selection easier?

People

- Does the organization have employees who cope well with change and uncertainty that often associates with large eLearning implementations?
- Do employees tend to embrace initiatives with long-term benefits to organization—even if resulting in few immediate or short-term benefits?

Processes

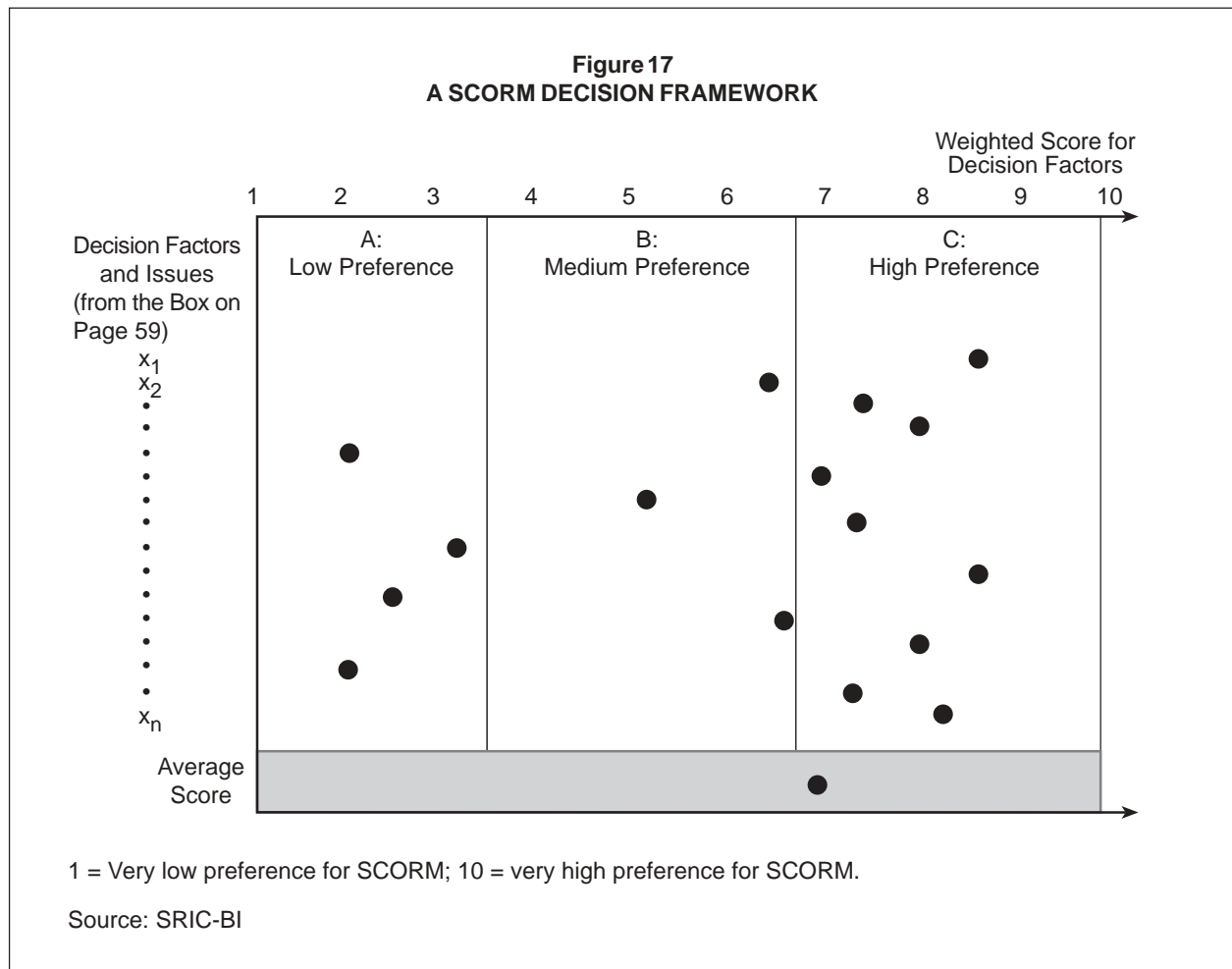
- Can companies readily put in place new workflows and processes that will result from policies, procedures, and tasks associated with the new SCORM-based approach to content design and development, for instance, and accept them without significant resistance and problems?
- Are effective communication and collaboration possible, for instance, with teams and committees active in operations and management of the eLearning initiative?

ISSUES AND QUESTIONS ABOUT SCORM ADOPTION—Concluded

Learning Vision and Plans

- Is the organization likely to be able to articulate a clear vision and plan for eLearning?
- Will management be able to develop flexible plans that adjust and evolve as new, and sometimes unexpected, developments emerge—or as SCORM evolves?
- Does the senior leadership recognize how to leverage a granular learning content toward performance support and customer learning in a way that generates greater long-term business impact and benefits?

An average score below a certain level, such as 3.5 (or in area A) in Figure 17 (each organization must decide what this value should be), indicates that the organization might not (yet) have the right conditions in place for a SCORM-based eLearning initiative. Higher scores suggest more favorable conditions for embracing SCORM.



Whether or not an organization goes through a formal decision analysis associated with SCORM adoption like the one above, a number of other actions are necessary for organizations that are considering launching SCORM-based eLearning initiatives:

- *Integrate SCORM into eLearning strategy and standards.* Although most organizations have some form of a strategy for their learning initiatives, at least at a high level, integrating SCORM into these plans as early as possible is wise. Doing so will facilitate corporate communication and education about SCORM, and the latter is important because SCORM is evolving, and learning technologies, including LCMS that are typically part of larger SCORM-based eLearning projects, are changing rapidly.
- *Find and leverage good or best practice.* Most organizations typically do some of this work, but most recognize that they could, and should, have done more in the preparation for and in the early parts of their initiative. Even when written (case-study) documentation is not widely available, early adopters are very often willing to share experiences with others (although access to companies in the same industry may be difficult, for competitive reasons). Site visits to companies that are among early adopters of SCORM can generate very valuable and useful insights.
- *Communicate and establish dialogue with ADL Co-lab.* Members of the IRS team, in particular, made it clear that they had gained significant benefits from an ongoing dialogue with the ADL Co-lab staff about a number of issues that emerged during the SCORM implementation. ADL also has extensive information and other resources available at its Web site, and its Plugfests, usually twice a year, bring together a variety of organizations that can provide useful information to any organization that is starting or planning to implement SCORM.
- *Take advantage of vendor expertise.* Although some vendors have been slow in embracing SCORM, many others have gained considerable experience and expertise through implementation projects with a range of companies. Inviting vendors to a workshop where they can draw on their experience to address specific questions that the host organization has—versus giving sales pitches—can be very useful in gaining different perspectives. Having an outside expert facilitate the workshop and discussion to ensure that participants address the issues and questions that the host organization needs to have answered to help it plan and prepare for its eLearning initiative would help ensure successful outcome. Most vendors would likely be willing to participate because doing so would give them an opportunity to demonstrate their experience and understanding of the issues facing the host organization.

eLearning Providers

eLearning providers of technology, content, or services need to recognize and understand how users' needs and interests are changing and what key issues and questions users have about SCORM. Many adopters are seeking a better understanding of a variety of operational and implementation issues, such as those in the case studies of this report. In

view of the trends that this report discusses, clearly companies that cannot yet demonstrate SCORM conformity of their products will miss out on a growing number of business opportunities. If the United States in fact implements a DoD directive to require SCORM, vendors that are not SCORM conformant will not even be able to compete for the sizable eLearning business generated in DoD. Because more and more government departments and agencies (in the United States but also increasingly in other countries) will likely follow the DoD lead, another sizable chunk of business will be off limits to companies that cannot meet SCORM-conformity requirements.

Earlier discussion in the report notes that all the major players even in the higher-education market for course-management systems have recognized in the past few years that they would benefit from being SCORM conformant. As a result they are becoming more active with the Academic Co-lab at the University of Wisconsin System (see <http://www.academiccolab.org>), for instance. Many others—see the SCORM-adopter section for LMS/LCMS of the ADL Co-lab Web site—have also sought certification for their systems, and many content vendors have done the same. These numbers will continue to grow, as will the players' participation in the Plugfests, as a means of networking into the ADL community.

Other steps that eLearning providers need to consider follow:

- *Demonstrate an understanding of customer and SCORM context.* As organizations adopt new learning initiatives with greater reach and scope, the complexity of a SCORM implementation increases. Vendors need to understand an organization's business drivers and issues, learning technologies, internal processes, and how SCORM fits into that context. A general understanding of SCORM is essential in today's competitive environment—to enable broad-ranging discussions with prospects and clients about trends and issues of learning technologies—but to deliver value to clients, the contextual application of SCORM to the client's specific situation needs clear and rapid demonstration.
- *Share SCORM implementation experience and best practice.* As organizations preparing for SCORM-based projects seek to benefit from early adopters who have gained and accumulated valuable experiences, vendors can play an important role. In the process, they can gain credibility and build trust with prospective clients if they can demonstrate that they have a valuable knowledge and experience base that has developed from their own projects. Vendors need to capture the practical experience they gain from learning what issues their clients run into and how these issues find resolution, and they need to leverage these insights in their dealings with prospects and other clients. Because many vendors now provide significant consulting services to their clients to help them with a range of strategic or implementation issues, they are in a good position to build a strong SCORM-implementation best-practice knowledge base. As organizations preparing for new eLearning projects communicate and interact with a number of vendors, the quality of their knowledge base, how well they present this knowledge, and how it is perceived by prospects will be a significant competitive differentiator.