

Transforming to next generation digital learning content

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The structure and nature of digital learning content is changing. Whole courses that mimic training manuals and textbooks are giving way to smaller, topic-focused chunks of interactive content deployed in layered learning infrastructures. Next-generation content of this nature can be used more efficiently and effectively. Organizations of all kinds and sizes can benefit from applying next-generation content strategies as they design and redesign their business practices and infrastructure, but many will have an immediate challenge: They possess valuable learning assets in the form of legacy courseware created with expiring first-generation tools. These organizations would like to simultaneously retain these assets, realize the advantages of next-generation content, and break the cycle of redeveloping content from the ground up at great expense every time a course needs to be updated or a format changes. This paper addresses three key questions related to this challenge:

- How can legacy content be set free to be used in multiple contexts and formats?
- How much value can be gained by doing so and is it worth the effort?
- Can your organization address the past while preparing for the future?

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Executive summary

Deriving value from legacy content while laying the foundation for a future of effective, flexible and reusable eLearning experiences is an achievable, cost-effective objective for many of today’s learning organizations. The key is to transform first generation (firstgen) courseware to genuine next generation (nextgen) content rather than simply transferring existing courseware into a new format. Transformation adds value: by making content more portable, searchable, customizable, and durable; by giving organizations and communities more control over their content; and by increasing its educational and training effectiveness.

Breaking the binding

Firstgen courses are largely variants of books on computers. It is now possible to “break the bindings” on these books. Emerging technologies and standards enable content to be extracted from whole course formats and be recombined into modules tied to learning objectives and competencies. These more granular resources can be placed into portable formats and structures that are easy to maintain and customize. Transformed content can be more easily found, modified, and deployed in new contexts—effectively breaking the endless spiral of redeveloping the same content from scratch every time a technical or instructional requirement changes.

Firstgen vs. nextgen content

There are significant differences between firstgen and nextgen content. Firstgen content tends to be locked into linear, fixed delivery packages intended for a single context and suitable for a single instructional strategy. Firstgen content is valued for its ability to fulfill curricular requirements and its compatibility with specific systems. It is controlled by its producers and used by its consumers. Nextgen content consists of granular learning objects that cleanly separate content from presentation and that can be recombined and restructured to address multiple contexts and multiple learning modalities. Nextgen content is valued for its discoverability, reusability, modifiability, and for the skills or knowledge it inherently addresses. It is an enterprise asset that can be customized to meet the needs of specific users rather than the demands of a specific system.

Conversion vs. transformation of legacy content

Organizations with legacy content in expiring formats and environments have two options. Content can be converted to a newer format while attempting to retain its appearance and structure, analogous to transferring a tape onto a CD. Conversion allows expiring content to be used for a few more years in its current form. Alternatively, and for the same cost or less, existing courseware can be transformed into standards-conforming content that retains the instructional impact and underlying assets of the original content but is more reusable, discoverable, and modifiable.

Nextgen content separates layers

A key characteristic of nextgen content is that it is separated into distinct layers that include content, structure, presentation, context, and pedagogy. Separating these layers makes it easier to manage, reuse, and personalize content and will ultimately result in more effective learning.

SCORM best practices

Industry standards such as SCORM¹ play an important role in nextgen content. SCORM is a set of rules that define how web-accessible content is packaged, transported, and tagged, and how data is exchanged between content and a learning management system (LMS). Just as following the rules for writing music does not necessarily produce a pleasing melody, using SCORM does not guarantee that content will be reusable or educationally effective. To achieve true nextgen functionality, best practices must be implemented in key areas addressed by standards such as SCORM, including metadata tagging, content granularity, results reporting, and the use of learning objectives.

The bottom line

An effective combination of planning, design, infrastructure evolution, and content transformation can prepare your organization to address today's eLearning content issues while laying an effective foundation for a highly productive nextgen learning environment. For those faced with a legacy content problem, tools exist that make it possible and cost effective to transform firstgen content into nextgen content.

Moving beyond “books on computers”

Firstgen digital learning content took the form of comprehensive courses that mimicked the linear, fixed structure of the textbooks and training manuals they were meant to replace. With the advent of web forms and desktop tools for creating digital media, these static “page turners” have evolved to include multimedia, interactive elements (such as quizzes), and some rudimentary adaptive behavior. Beneath the surface, however, these courses retain a high degree of rigidity characteristic of their textbook heritage. The typical online course is still designed and published for use in a single educational or training context. It is created with proprietary authoring tools and packaged

¹SCORM (Shareable Content Object Reference Model) is a collection of standards and specifications compiled by the U.S. Advanced Distributed Learning Initiative (www.adlnet.gov).

in a way that makes it difficult to update or alter its contents. Little or no thought is given to tagging or increasing the granularity of the content so that its component parts can be more easily managed, found, and repurposed across complex, distributed technology infrastructures. In essence, firstgen digital learning content is like a movie on videotape—it is linear content produced in a digital form intended to be consumed as a whole, rather than a group of scenes (think YouTube) that can be collected from different sources, repurposed, mashed up, personalized, and used many times in many different ways and in many different contexts.

Nextgen learning content is different; it reflects the digital age trend towards content granularity, and user control, where music is sold by the song instead of by the album and movies are broken up into chapters and scenes. Rather than being bundled as whole courses, nextgen content is developed (or disaggregated from existing content) in smaller chunks that can be used in a variety of instructional models and contexts. And instead of being controlled solely by its producers, nextgen content can be created and managed by an enterprise or community. Nextgen content is developed to serve a particular function rather than a specific context. It can be reused, transformed, personalized, and redistributed. It is also no longer the equivalent of a classroom lecture delivered to (or at) a student: The new generation of learners is demanding that learning be an engaging social activity and that they be at the helm. Nextgen content structures are a key component in developing these new adaptive, user-controlled learning environments.

From an organizational perspective, nextgen content represents a transformation from content that is a consumable asset used for a single purpose within a limited time frame to a durable good that can be updated, enhanced, repurposed, and reused. Existing eLearning content is usable in one context and is often tied too closely to a specific technology. Nextgen content is more flexible and “future proof.” It can be continuously updated and repurposed in a variety of ways and can be deployed in an ever-evolving eLearning technology environment. Nextgen content lives independent of how it is organized, sequenced, and delivered in a particular context.

New values for content

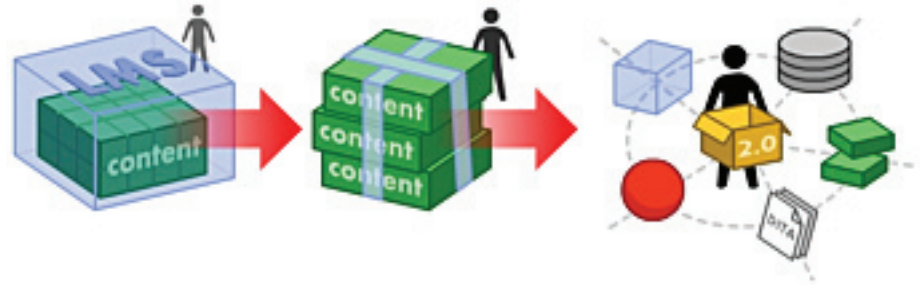
When content is developed for one system and one purpose, it is valued for how well it works in that system and how well it achieves that purpose. When a company deploys a single online course to fulfill a labor law requirement, the practical concerns are: Does it work and does it meet the requirement? When an organization is managing an entire education and training program, for itself and its customers and across multiple communities and locations, the values shift. These values become important:

- Discoverability—Finding what content is available, and more importantly, the ability to find content that addresses specific objectives or competencies
- Contextualization—Finding or modifying content for a particular educational or training circumstance
- Reusability—Easily adapting and updating context and deploying content in a variety of formats and using a variety of instructional design models
- Engagement—Engaging the learner on multiple levels: cognitive, social, affective, and even psychomotor
- Effectiveness—Documenting the content’s success in helping the learner master the objectives or competencies it was designed to address

Moving from monolithic content to Web 2.0

In the transition towards nextgen functionality, content structures are transforming from content as a single object to content as a package of objects to content as an associated set of objects. This movement is reflected both in formats and standards. Formats produced by applications such as ToolBook and Adobe® Authorware® are being replaced by more granular objects (for example, SWF or FLV movies), and these newer objects increasingly rely on assembling external sets of resources to construct the final learning experience.

Standards like SCORM enable resources to be packaged and moved from authoring environments to LMSs in a portable and interoperable manner, and newer standards such as the Darwin Information Typing Architecture (DITA) can associate diverse resources and multiple versions of the same resource with the same functional element, thereby making it easier to maintain and contextualize content.



Content structures are transforming from single-object structures to a package of objects to an associated set of objects.

Separating layers: a design imperative

A core characteristic of nextgen digital learning content is that it is optimally separated into distinct layers:

- Content—Meaning as expressed in text, graphics, or interactive objects
- Presentation—Format, fonts, colors, images, and so on
- Structure—How the content is broken into units and how these units are navigated
- Context—Application of content to a particular job or skill context, technology constraints, time constraints, previous knowledge, social context, and experience needed to make effective use of the content
- Pedagogy—Strategies used to organize the content to affect and measure learning

In today's world of standards and tools, it is a fundamental principle of good design and a key element of reusability that these layers should be separated to the greatest extent possible.⁴ Each of these layers has the potential to impact the value of digital learning content and it should be possible for an organization to optimize each layer independently. For example:

- If content is authored using graphics that cannot be changed or replaced, then it will not be possible to relabel or rebrand the content or to create versions that are usable on devices with smaller screens.
- If the structure and content of a course forces it to be navigated as a linearly ordered series of pages, it will then be difficult to use just a few of the pages or to direct the learner to exactly the content needed to answer a particular question or to address a narrowly defined objective or competency.
- If a course is designed as a single-learner linear instructional experience that references highly specialized cultural artifacts, it will generally be difficult to use in an immersive multiplayer distributed environment. However, if the content is sufficiently granular and cultural references can be easily replaced or removed, then the content may be deployable in such an environment with relatively little effort.

⁴As discussed in a chapter on reusability and reusable design in *Trends and Issues in Instructional Design and Technology*, 2nd edition, by Robert A. Reiser and John V. Dempsey (Prentice Hall, June 2006).

In firstgen content, all of these layers tend to be integrated. This reflects its schoolhouse and textbook heritage. These are controlled environments in which many valid assumptions can be made and exploited. But the audiences for nextgen content are neither homogenous nor will the content be used in a single, controlled environment. Nextgen content must do a far better job of separating layers, and simply recognizing this during the content design and creation process will enhance the value of the content.

Legacy courses: conversion vs. transformation

If it is clear that nextgen content will have characteristics that differ significantly from existing eLearning content, it is equally clear that enormous value is present in firstgen digital learning content that has been written by experts, developed by professionals, vetted with learners, and often certified by industry authorities. What can organizations do to capture this value and move to nextgen content without “throwing the baby out with the bathwater?”

Organizations with legacy courses in expiring formats have two basic options. The first option is content conversion. This usually involves transferring the content from one proprietary format to another while maintaining the same capabilities. In some cases, such as conversion from Authorware to Adobe Flash® software, the new format may have fewer liabilities and some inherent advantages over the old format. Several vendors offer content conversion services and for some organizations content conversion is a good option, particularly when the existing content has been certified and any change in appearance or functionality requires recertification.

Nonetheless, content conversion is a limiting option, analogous to transferring a tape onto CD. Conversion allows the content to be reused for a few years but requires another conversion when the new format is discontinued or is overtaken by a disruptive technology. More importantly, conversion preserves value but does not add value. It’s great to be able to stream a ten-year-old “page turner” course from the latest and greatest content server, but it doesn’t make the course any easier to discover, repurpose, or recontextualize, and it doesn’t make the content more engaging for the learner.

Content transformation is a process that changes not only the format of the content, but also its underlying architecture. Transformation is analogous to moving music albums from analog to digital formats, chopping the albums into songs, putting the songs on a server, opening them up to user reviews, and enabling them to be bought and sold individually. Once this is done, many new options appear: songs can be rearranged, more easily copied, and edited/enhanced with desktop software. New business models are available and new customers can be served.

Transformation from analog on tape to digital on the web provides a huge value improvement, but even more significant value is generated when new content is developed digitally from its inception. In the music world, this occurs when each track of each song is recorded separately in digital form. Musicians can share ideas and collaborate over a distance and the tracks can then be mixed, modified, and blended in virtually unlimited ways. The analogous improvement in value occurs in the learning content world when the content is developed using standards-based formats and structures and each layer of the course (content, structure, presentation, context, and pedagogy) is appropriately separated.

Content transformation is often no more expensive and in some cases is easier than content conversion. It is also an accepted engineering principle that conversion accentuates defects whereas transformation has a chance to eliminate them. For example, when converting audio from one analog format to another, the signal-to-noise ratio deteriorates and it is increasingly difficult to eliminate annoyances like tape hiss. Once digital, it is a lot easier to filter out the noise and enhance the signal. A parallel phenomenon occurs when transforming learning content. When content is developed using multimedia authoring environments, design decisions are

often forced or influenced by the capabilities of the medium. For example, creating web pages whose content, presentation, and navigation depended on a learner's past record was not possible in the pre-SCORM era other than by using proprietary tools tightly bound to a single LMS. A developer using a web development tool in the pre-SCORM era had to work around the lack of this capability, even if highly adaptive pages were indicated as part of an overall instructional strategy. Converting the content produced by that developer to a more current tool will preserve this unfortunate lack of capabilities, whereas effectively transforming the content will enable adaptive behaviors to be appropriately reintroduced.

SCORM done right

The move from firstgen to nextgen content has been in part enabled by the development and adoption of industry standards and specifications such as SCORM. It is therefore worth examining what SCORM and related standards do, and how they can and should be applied.

At the most literal level, standards like SCORM are documents that define rules for representing, communicating, and processing data. These are called interoperability standards. SCORM specifies the way in which web-accessible content is packaged, transported, and tagged for use by LMSs and how data is exchanged between content and an LMS.

But SCORM is more than a set of rulebooks—associated with SCORM is a set of best practices. SCORM was developed to enable a set of capabilities such as portability (develop once, deploy anywhere), durability (develop now, deploy for the future), reusability (reuse, don't redevelop), and maintainability (update the content easily). SCORM was also developed with the goal of enabling learning environments to implement multiple instructional strategies and adapt to the learner's needs and knowledge. In other words, SCORM was developed to support two different sets of goals: a set of business goals that make online learning practical and a set of instructional goals that make online learning effective.

New technologies and new processes often undergo a simplification and lose their impact as their features and benefits are communicated from visionaries to practitioners to managers to procurement specialists to suppliers. The new technology becomes a checkbox on a request for proposal (RFP) and when it arrives at the end user's loading dock, there is little awareness of what it can (or should) do. If it doesn't get in the way of existing practices, nothing changes; if it forces new behaviors, it is viewed as a thorn in the side of people who were doing perfectly well without it.

In the case of SCORM, this is exactly what has happened. SCORM was purposely designed not to dictate specific content management and instructional practices, and as a result, the vast majority of SCORM content has been created by "wrapping" existing content in the minimal way needed to be considered SCORM compliant. PowerPoint presentations with SCORM wrappers are viewed in some circles as a SCORM-compliant course, and custom content developers are using SCORM as a way to ensure that their courseware can be loaded into a customer's LMS but are not taking advantage of all the other things that SCORM offers.

To fully benefit from SCORM, there are a few simple best practices that are not difficult to implement, but are profound in their impact on the quality and flexibility of the learning content:

- **Metadata**—SCORM includes the ability to tag content with descriptive and educationally relevant metadata. Few take advantage of this ability, yet metadata is a key component to implementing effective search strategies in distributed organizations.
- **Granularity**—SCORM is built around the concept of a sharable content object (SCO). An SCO should be designed for reuse and sharing and it should generally be homogeneous and self-contained. "Homogeneous" means that an SCO should address a single topic, idea, or learning objective and should have an internally consistent look and feel. "Self-contained" means that SCOs should avoid relying on external resources for doing their job and should

not link directly to other SCOs. Different organizations and disciplines can (and should) develop and implement their own notion of the optimal granularity and design of an SCO, but one thing is certain: Wrapping a large course in a single SCO "wrapper" is almost never the right thing to do.

- Objectives—SCORM content is typically “formal” learning content and should therefore be tied to learning objectives. SCORM is designed to enable content to report on and retrieve information about objectives. Competencies and/or learning objectives should be an integral part of any nextgen learning architecture. Data about learner achievement may not be used in a given situation, but if it is not reported to other learning architecture components, it can never be used.
- Learning paths—Using objectives, content can be designed so that learners can skip things they know and review things they don’t. This is basic, productive, and efficient instructional design. More generally, learners can be shown different content or taken on different paths based on the competencies they have achieved and proficiencies they have demonstrated. SCORM is not about creating “page turners,” but about developing highly interactive, efficient and targeted learning experiences.
- Formats—SCORM supports reuse and repurposing. Ideally, a SCORM course should be editable using simple, readily available tools by anyone who has the right to do so. Furthermore, it is basic business sense not to trap content in formats that will not be usable or easily converted to usable formats when new technologies emerge. This speaks to using open, extensible, standardized content formats.
- SCORM benefits—Over time, SCORM will undergo additions and changes.[‡] Simulations and games, multiuser SCO’s, mobile learning, and the enormous cultural diversity of the SCORM user community are all creating requirements that are not met by SCORM as it is today. Yet, as tempting as it may be to go around the SCORM model and rules to accommodate these things today, it is a mistake to do so. Adding components and programming to SCORM content that require a nonstandard LMS or a nonstandard learner environment takes away many of the benefits of SCORM. It is far better to accomplish the same goals in other ways, preferably using additional sets of open standards. Experience teaches that it is usually possible and most likely beneficial to do so.

Conclusion

As the table below indicates, nextgen content is very different from firstgen content.

Firstgen content	Nextgen content
Monolithic and linear	Granular and adaptive
Web 1.0 content is static	Web 2.0 content is dynamic and changeable
Developed by technically skilled staff	Developed by community and able to evolve
Often untagged on hard-to-find servers	Tagged and searchable by entire organization
Single purpose and context	Adaptable to multiple contexts
Integrated component packaging	Constructed in multiple, separable layers
Proprietary delivery platforms	Open standards/interoperability

For organizations with legacy content in expiring formats, transformation to nextgen content has many benefits. It provides a path to the future while making existing assets more portable, discoverable, durable, reusable, customizable, maintainable, and effective. But can it be done in practice and at what cost?

[‡]The stewardship and evolution of SCORM is being transferred to the nonprofit federation for Learning, Education, and Training Systems Interoperability (LETSI). For more information and to sign up for a free account, visit the LETSI website at www.letsis.org.

Here there is encouraging news. Tools and technologies are appearing that help disaggregate existing content, convert it to more granular and standardized formats, structure it into appropriate instructional strategies, tag it with metadata, associate it with learning objectives, and publish it as SCORM content. These tools incorporate and facilitate best practices and automate many of the underlying processes, so that transformation is not only achievable but possibly less expensive than conversion. Once transformed, the use of standards-based editable formats makes it possible for almost anyone to tailor nextgen content to specific business needs and learner situations. Transformation to nextgen content offers an attractive, cost-effective alternative with immediate and long-term benefits.

However, this white paper is not just about legacy content transformation. The principles in it are relevant to any organization in the process of designing or redesigning its learning content strategy. In fact, the organizations that stand to benefit the most are those who have the opportunity to design a nextgen content strategy from the ground up and to incorporate associated business processes, best practices, and technology at the start. To do that, an organization must plan for changes in both infrastructure and processes. This is easiest when there is a clear goal and model in mind. Fortunately, such models are starting to emerge in practice, and we hope this white paper will help point the way to setting the appropriate goals.



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