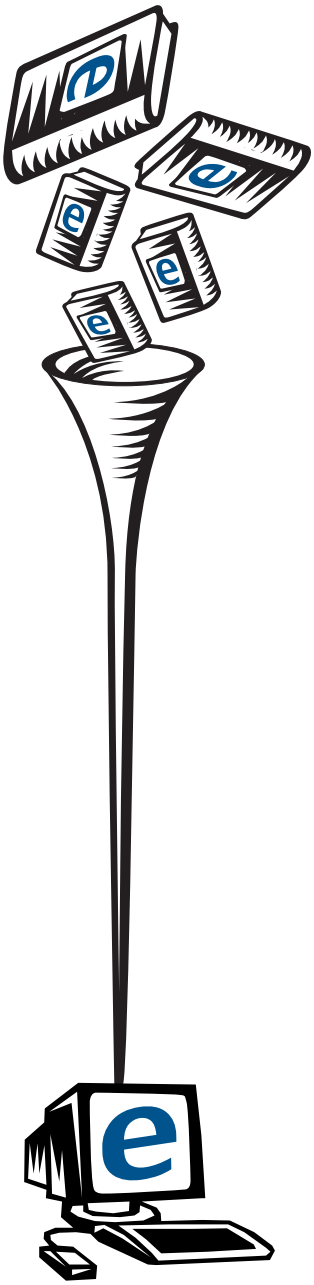

Creating a Very Large E-Learning Library Within a Very Short Timeframe

by Robert Edgar

Suppose your company, a developer of custom e-learning solutions, has just landed a contract to convert more than 1,000 hours of printed legacy training material to a Web-based format, and you are the project manager. Where would you begin? You have a little more than seven months to complete the project, a deadline that seems nearly impossible. The project must be completed by then because your client has announced that its online university will be posted on the Internet by summer. Your company has committed to the deadline. Furthermore, your company has a good working relationship with this client, having developed computer-based learning for it before. You want to maintain the good developer-client relationship. Rather than booking a one-way ticket to a tropical island, you sit down at your desk and think through the project.

Many companies are now investigating the advantages of converting their legacy training material, that is, printed or standup instruction, to a Web-based format. A massive conversion can only be successfully completed within a very tightly structured process. This article provides guidelines to instructional designers and multimedia developers that will help prevent costly problems in the process.

Initial Planning and Organization

Investing a month at the beginning of a massive conversion to organize the project is time well spent. This month of planning enables the developer and client to agree on project details. When content work begins, the developer is then able to move forward and effectively mass produce modules of e-learning using the equivalent of an assemblyline process.

A good first step in the month of planning is a joint application development (JAD) meeting between the developer and client to obtain signoff on the overall business goals of the project. The JAD meeting includes the client's information technology managers and content managers as well as the developer's principals. Anyone who has client contact with approval authority should attend. In a traditional JAD, the agenda is structured and the meeting moderated by an independent third party, who understands the goals and keeps the attendees focused on them.

At this JAD, the three groups create a list of business goals and needs and a preliminary set of business rules that the site should follow. Following the meeting, the developer can structure all the notes and decisions, find holes that still need to be filled, and work with the decisionmakers to create a very detailed business specification document. This document, which can easily be 30–50 pages, defines the overall project goals.

Among other things, the business specification includes the following:

- Style-guide concerns: All screens should have a consistent look, including the page layout, use of association name, website name, and logo.
- User navigation requirements.
- Crosslinks included to the Help system, to other courses within the online university or library, and/or to other sites. Priorities are established, whether the priority is the instructional value of each page or the cross links.
- Existing and new course file format parameters: Audio, video, interactions, PDFs as well as text.
- Target audience description, complete with platforms and online connections (that is, whether users have slow 28.8-Kbps modems or fast digital subscriber lines effects how long it takes them to download large files).
- The organization of existing course content and the required content of the online courses. This can include introductions, objectives, body, conclusion, review notations, table of contents, feedback types, exercises, and exams.
- What information must be recorded about the learners, course usage, and test scores.
- Linkages to any existing legacy databases, such as a customer database, to validate enrollment and to track courses taken. Are new databases needed? Who is responsible for developing and maintaining them?
- What business rules pertain to login, e-commerce, and course registration? How long will registration be good for? How long will records be retained?
- How will information and, if applicable, proof of successful course completion be delivered to the learners?
- Agreement on extra customer service features, such as a survey for learners to complete at the end of the course and email links to customer service.
- A project timeline.
- Responsibilities of the client and the developer at all stages.

The business specification may also address whether the client wants to allow different categories of learners to the site, including individual users, corporations with variable numbers of users, and users with special access privileges.

Finally, the business specification provides a forum for defining marketing goals for the final site. A client may be interested in cross-selling other products or generating repeat participants in online courses. Delineating marketing goals early enables the client to add promotional offers to encourage learners to tell others about the site. The client can also think through its preferences for assessing customer satisfaction, such as tracking repeat visitors or posting a survey at the end of every course. Most of these methods require programming and development of collection, storage, and reporting mechanisms, so it's best to think of them early.

Examining the Content

With a conversion project, the content already exists and is usually in a variety of print documents. Frequently, companies have both self-paced and leader-led courses, written by many different authors over many years. Given the variety of authors and deliveries, it is unsurprising that the style of these various legacy documents is different. For example, some courses may have footnotes while others do not, or some may have line drawings that need to be redrawn. If your time is very short, you may not be able to look at all the documents before starting to process them. This means that if you sample 100 or so and design a procedure for marking up and processing standard documents, each with three-to-four photographic-quality graphics, your procedure may not work on an unexpected 50 documents that are all in outline form, with a scientific notation used throughout that your chosen browser font doesn't handle. The project manager should view all the source documents available, categorize all the common attributes that will be processed, and be prepared to adapt for any variations that come along unexpectedly.

There can be quite a bit of difference between the steps involved in translating legacy print materials so that they can be delivered over the web (porting), and those involved in designing new training materials. A client that wants

legacy training materials ported to the Web may not be interested in or have the time to reconsider objectives, tests, exercises, and content. Thus, porting involves doing the best translation possible of print- to Web-based multimedia. Charts and diagrams may be added to help communicate concepts, but a schedule may not allow the developer to ensure that all objectives, tests, exercises, and content are aligned. It is important for the developer to agree with the client up front on how much instructional design and editing will be done during the porting. Again, processing a sample up front is the best defense against taking on more than you can deliver.

Many courses designed as self-paced paper texts can be very long. Such material must be broken down into short modules, named, and delivered as computer-readable files. If the client has a big server with gigabytes of files, then your porting job is that much easier. If the client has a big room filled with file cabinets of printed courses with no computer files, there is a lot of work ahead.

If the courses are missing objectives, it may be quicker to teach subject matter experts (SME) to write them than to send instructional designers into the content with hopes of quickly understanding both the subject matter and the scope of each of hundreds or thousands of courses. The project manager must work with what he or she has, keeping the schedule and production scope in mind. The temptation to dive deep into the content can be great, but what works with five, ten, even twenty hours of content can prove fatal to the large project of hundreds or even thousands of learning hours. One must balance one's best instructional design instincts with what it takes to successfully complete the project.

In cases where specific forms or graphics are part of the legacy content, scanning in the forms and delivering the results as graphic or Acrobat files is a good option. Artists should optimize all graphics, charts, and forms for the smallest file size possible, retaining whatever legibility is necessary. If learners will be connecting through a 28.8 dialup connection, they should not be downloading 300-kilobyte files; even a 56-Kbps modem may connect at 28.8 Kbps if phone lines aren't optimal.

Functional Specification

With the business specification drafted, the developer then creates a very detailed functional specification, converting the business goals to website functions. The developmental relationship between the business specification and the functional specification is direct: The business specification defines the problem, and the functional specification states the solution.

The completed functional specification becomes an extensive and specific document, which can run into hundreds of pages. Whereas the business specification was written for a business audience, the functional specification is written for a technical audience. It becomes an invaluable working document as a reference for both parties.

Briefly, a functional specification should include the following:

- Naming conventions with explanations for all acronyms and file names.
- A site map and description, with a list of users and their uses for the site.
- A listing of development tools, programming languages, platforms, and hardware to run and host the completed site.
- An extensive list of all functions, with a flowchart for each, as well as a description of how each function works. For example, the function list should cover logging in, navigation, catalog and course search routines, serving the course files, updating and other site maintenance functions, recordkeeping and reporting, etc.
- Database designs with dataflow diagrams, descriptions, and a data dictionary.
- User interface designs and style guides.
- Explanations of administrative functions, such as data harvesting, site maintenance, and courseware production.
- A project timeline with deliverables and success metrics, defining terms of acceptance for each deliverable. A development project typically is broken down into stages of prototype, alpha, beta, and final, with developer and client responsibilities for each stage. Finite review times for the client are essential.
- Documentation deliverables defining the client's requests to have the programming and functionality documented.
- User testing strategy defining the actions the developer will take and when to ensure that the resulting website will have a user-friendly interface and navigational scheme.

Many course management systems are available on the market, and the client and developer may decide to implement one of them rather than developing their own proprietary version. The client and developer should make porting management decisions based on short- and long-term requirements of the business, schedule, and users as early as possible. The decision is not just one of instructional integrity, but also of technology (server and client platforms

supported, course management system integration with existing hardware and software, authoring system used) and the user needs.

In addition to a style guide, a developer delivering online content must lay the groundwork for a consistent overall browser appearance with style sheets. The style sheets define the font, size, style, and color, level of heading, and other attributes for every text element. The goal is to identify styles that result in a consistent appearance with different browsers on different brands of computers. Before proceeding, the client signs off on the styles. Even with well-laid plans, the styles do not always convert as expected. Developers may discover that a word processor used to develop the content does not translate the characters or styles exactly when exporting HTML files. An HTML programmer can be assigned to clean up the code in every file, but one should not underestimate the amount of time this takes. Testing the word processing application's conversion capabilities and editing the output should be incorporated into the procedure and integrated into the production process.

An authoring tool that may work well for individual course development may not work well for large-scale porting. A nice what-you-see-is-what-you-get (also known as WYSIWYG) authoring tool that allows nontechnical authors to enter text easily into forms and text fields may not scale well if it means cutting and pasting thousands of texts. Identifying objects within a text by entering markup code is an alternative method. Marked-up texts can then be parsed by script files, which search for the markup and process each object accordingly. The functional specification is a good place to describe the markup language, the design of the parser, and the file types of the input, output, and mid-stage documents.

Exercises and post-tests will require design and coding, not just text porting. If at all possible, the developer should standardize this phase of the project and automate it so existing exercises and tests can be easily converted to whatever code (such as Javascript) is being used. There are many ways to do this. One way is to employ markup language. The developer can import the marked-up exercises and post-tests into templates marked with tags. Once the marked-up files exist, they can be run through a parser to convert the files into elements to be read on the site by a presentation and evaluation engine.

The online engine should present each part of an exercise, accept user input, evaluate the input as necessary, branch and provide feedback as necessary, and (in accordance with the business rules) track responses for each individual taking a course. The engine is able to judge and branch, sending the individual ahead in the course or giving him or her the appropriate remediation.

Beginning the Conversion

With both parties agreeing to the goals and specifications, and the content modularized and marked, the developer is able to proceed with the conversion. While there are many production flow approaches that might work, experience shows that using teams to complete individual segments of e-learning works well.

In this model, each team is responsible for organizing the content, creating the graphics, and developing the HTML code for a module. With this approach, the graphics, code and content stay together in passing a module from one function to the next. Teams consist of a writer, a graphic artist, and a coder, with responsibilities as follows.

Writers

With a conversion project, the developer is furnished with completed content. Writers serve as final-stage instructional editors, organizers, and media writers for the modules. Even though they need a varied skill set, perhaps most important for this function are good English skills, as they are responsible for the final words.

The writers determine how much content will fit on a screen, entering appropriate marks to show the programmer where each screen of content ends. The writers also are charged with envisioning items that will work well in pop-up windows or as other forms of interaction, and marking these elements with the appropriate tags. (Obviously, a standard markup language across teams is key.) If graphics are an important part of the project, as they often will be in Web-based instruction, writers can also be responsible for describing images that will help illustrate concepts presented in the text. The writers look for elements that will enhance the course and meet educational objectives if those elements are presented as video or audio; they write scripts and mark the screens for where those elements will be added.

How much text should go on a single screen? It is better to have many short screens than to force the learner to scroll down long pages of text. It is important to allow the learner to retain a sense of orientation while taking a course online. What good is reading a screen counter (for example, screen 5 of 35) if the learner can't estimate the size of each screen? When a writer is done with a file, he or she passes it on to a programmer for processing and passes the media requests on to media production.

Graphic Artists

The graphic artists function as media developers, responsible for creating the graphics or animations defined by the writers, as well as handling the background and any layout graphics. Media producers record audio and manage the production of any specified video. When the recorded audio and video are edited and converted into files following the specifications in the Functional Specifications, the files are placed into directories on a common server so that the writers can check the modules.

Programmers

Programmers are responsible for assembling the text, graphics, feedback, media, and final quiz into HTML pages as specified by the tags and markups the writer entered. When they complete a module, the programmers return the module to the writer for proofing and corrections.

With the tasks and job responsibilities defined, the key to being able to complete an extensive conversion project on time is adequate resources. Any project is possible with enough people. If you have done the preliminary organizational work and have just six months, *how many people do you need to develop 1,000 hours of e-learning?*

To decide how many people are needed for each phase of the project, there's nothing like project management software. The critical variable is the length of time it will take each of the team members to complete his/her portion of the work on a module. If the developer underestimates this number, the project will never be completed on time. To estimate the length of time correctly, the developer runs some benchmarks, creating a few modules and recording the time involved. On one conversion project, the benchmarks resulted in the following metrics, on average (see Figure 1).

FUNCTION	ONE HOUR OF E-LEARNING
Writers	1.5 days (12 hours)
Graphic artists	.5 days (4 hours)
Programmers	.5 days (4 hours)

Figure 1. Man-Hours Required per Hour of E-Learning.

Given this rate, if there are 1,000 hours of e-learning to create, 14,400 man-hours are required for writers alone. If the conversion project is due in 6 months, at least 15 writers are needed for the project.

The next challenge the developer faces is consistency. How can 15 different writers possibly create modules with consistent language and similar conventions? To solve this problem, the developer again applies up-front organization. On a recent project, I borrowed from an earlier experience on an instructional design contract. The client on that years-ago project gave two weeks of intensive training to 21 instructional designers before they were sent into the field to begin task analysis and instructional design. The training ensured consistency across designers in various locations.

Project Adjustment

With the teams initially trained and in place, the development work begins en masse. There are inevitable adjustments in workflow, as some modules and some courses take longer to develop while others go smoothly. Sometimes backlogs occur in the workflow, where one team member gets far behind the others.

Exercises and Feedback

Exercises and feedback are extremely important in e-learning, or any form of computer-based training, to ensure that learning is taking place. Furthermore, exercises and feedback serve to create a positive learner experience and keep the learner interested. A variety of feedback styles is essential to keep interest levels high. The developer specifies the type of remediation to include in every module. Early in the project, in the initial functional specification, the developer designs the feedback and defines the remediation flow.

Many exercises, regardless of type, contain common elements. For example, they typically contain an initial question that tests a specific segment objective and a second parallel question that tests the same objective but uses different data. There probably aren't parallel items in a legacy print course. Either the project goes without them, SMEs create them, or instructional designers create them. If you want to have remediation that includes parallel questions, the SMEs should create them. It's a simple matter of time. Instructional designers should create a flowchart for the remediation structure. From flow charts such as these, the developer is able to create very accurate feedback templates to give to the client for feedback on content development. Furthermore, these flowcharts are essential for the software that manages and tracks a learner's progress through a module. Most authoring systems offer a good range of exercise types (fill-in-the-blank, true-false, multiple choice, essay, etc.) and simple, form-based interfaces that allow an author to design whatever structure best fits the current need.

The important thing about large-scale legacy porting is that exercise, question, and remediation structures have to be

managed—the developer usually can't afford to customize the format of each course, much less every exercise. A few useful algorithms should be decided on up front, and then exercises written to conform to them.

Infrastructure

While the content teams are preparing and programming the e-learning modules, another group begins building the infrastructure. The specifications for the infrastructure, outlined in the functional specification, may include the following elements:

- Links to an existing customer database and tracking of customers
- Browsing and search features so learners can locate courses in the catalog
- A Help system for learners with questions about operation of the site or courses. Several functions can be implemented within the Help system, such as looking up topics, a site tour, and accessing a list of frequently asked questions.
- An email function for customer service-related questions.

The link to a pre-existing customer database can be an important requirement for an e-learning site. In creating e-learning, a client not only converts its training materials to the Web, it also has to convince customers to use the Web regularly and be comfortable with it. For example, customers accustomed to ordering printed training materials from the client or attending a class sponsored by the client now have to pay for and take their courses on line. Their initial online experience has to be simple and positive. When learners first connect to the site, they should be greeted with a friendly login screen. Each learner's name and password are then checked immediately against the customer database and allowed access if appropriate. From that point, information about the learner (whatever is specified in the business specifications) is tracked. If specified, the developer will enable learners to access their own records and email official certification of course completion if they wish.

Other aspects of the infrastructure are also designed to enhance the learner's online experience. For example, a search function can enable learners to search through the site by course title. Learners may want to look for training offered in any medium related to a specific topic. The site should include a map offering a flat look at the entire site, providing single-click access to anything depicted.

Review Cycles

Infrastructure review cycles should be built into the project schedule at prototype, alpha, and beta stages. Reviews of the course content should be scheduled separately. (If at all possible, course content review should begin as soon as the first courses are completed.) As the number of completed modules increases, the time required by the client to review also increases. SMEs need to be scheduled to go through each module to ensure that the original meaning has remained the same even though the presentation has changed. It is crucial to build enough time into the schedule for adequate client review, or a client will still be reviewing and editing content right up to site launch.

Quality Assurance

Testing the hundreds of modules with remediation is another very large part of a conversion project. Quality assurance should be in place before the writers complete their first modules. Having a separate group of testers has proven to be the right decision because they have not seen any of the pages before. Their fresh eyes are better able to identify little typos or incorrect tags that team members have missed, simply because the writers are too close to the material.

Delivering the Finished E-Learning Library

The client completes its review and testing, and although a few minor fixes remain, the client is very satisfied and opens the site for customers.

Perhaps the hardest thing to remember in taking on a large conversion project with a short schedule is that you must design the roles so that each piece of content is touched only lightly, and as few times as possible. Batch process as many files as possible—the time savings can be tremendous if you have taken the time up front to get your settings right. And remember—companies with legacy materials are legacy companies. Be prepared to shoulder a good deal of icebreaking as you work with them to create their new site—you are also helping them give form to a new identity.

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