Case Study & Lessons Learned

PREVENTION AND MANAGEMENT OF DISRUPTIVE BEHAVIOR (PMDB)

A federal training program collaboratively developed by the U.S. Department of Veterans Affairs in partnership with the U.S. Navy, U.S. Air Force, and U.S. Army

Prevention and Management of Disruptive Behavior (PMDB) is a pilot course designed and developed under the auspices of VITAL Collaborative Training Network. To make best use of available resources and share content across agencies, all but the hands-on portions of PMDB content was migrated to a 2-3 hour web-based, interactive course.

**Sharable**
Targeted to ANY employee engaged in direct patient contact at ANY medical center.

**Realistic**
Make decisions and discover the consequences in complex scenarios drawn from actual on-the-job situations.

**Searchable**
Access tutorials from any screen. Use topic list or keyword search to find information fast.

**Engaging**
Game: Choose the best response to defuse escalating situations, before the clock runs out.
Case Study

The Making of Sharable Training Software

Beginnings

We gathered in a made-for-collaboration training center in Salt Lake City, Utah. For three days we were going to work face-to-face establishing the design of a course for medical center personnel that would be truly sharable across government agencies. Our group included representatives from the Navy, the Air Force, the instructional designers/facilitators, and the host organization, Veterans Health Administration (VHA) Employee Education Services (EES), part of the Department of Veterans Affairs (VA). Most were meeting in person for the first time. An Army representative joined the team shortly after the in-person meeting.

The preparations for this event had been underway for months – from initial visioning, contracting with instructional design experts, stakeholder selection, and team member commitment.

The idea for truly sharable courseware had been incubating for several years. In September of 2005, EES established a policy calculated to institutionalize, as much as possible, a culture of openness and reusability in government healthcare training.

The VA wanted to effectively leverage its limited education and training funds. They viewed the efforts of the Advanced Distributed Learning (ADL) Initiative office and ADL’s Sharable Content Object Reference Model (SCORM) as one way to do this. Congressionally commissioned and mandated by the Department of Defense (DoD), ADL was chartered to provide the means for reducing training redundancy within the DoD specifically and the government in general. Versions of this model have been available for some time. However, with the release of SCORM 2004, it has become more practical – even instructionally efficient and effective – to institutionalize conformity to the model.

In the first stage of this process, the VA determined the need to establish cooperative design and development relationships and sharing partnerships with other government agencies that provide healthcare services. Many hours were spent identifying appropriate personnel, gaining support and cooperation, and negotiating working agreements. In order to establish equity among the participants, the VA partnered with a neutral third-party facilitation and training group.

A test course needed to be identified – one that would hold the highest potential for generalized application, reusability and return on investment. The VA looked for a course with stable and established content. While any course needs to undergo periodic content review, the aim was to
find one that would test the collaborative process more than the coordination and consensus of subject matter experts. In early 2005, the VA identified “Prevention and Management of Disruptive Behavior” (PMDB) as meeting these criteria.

With a course in mind, stakeholders identified, and interested parties committed, we held a Kickoff Meeting via web-conference to clarify the high-level plan for achieving the project goals. By the time we met for the Design Workshop, everyone knew the overall specifications of the final product, and the timelines for its creation, review, and delivery. We knew our roles and responsibilities and how we would be measuring success. Our participation as Design Team members would be ongoing for the one-year life of the project, and individuals were identified for specific functional roles: subject matter experts, technical experts, reviewers, and points of authority for both collaboration and content issues.

In the few weeks between the Kickoff Meeting and the Design Workshop, we took several steps to maximize the potential for reaching agreement and designing a solid, sharable course usable by all participating organizations. We communicated individually with each design team member, soliciting input from their particular area of expertise. All were asked about overall requirements for the training. Subject matter experts were queried about audience characteristics, content, and the learning environment. Training representatives contributed design and technical requirements. These requirements were entered into tables, given unique numbers, and formed the basis for requirements discussions at the Design Workshop. Formal approval by design team members occurred prior to full-scale design and development.

To jump-start the design effort, we submitted three interface “look and feel” samples to a Design Team vote. Later we added a fourth, a grey-blue version, which ended up being the favorite.

In addition, a mini-course on SCORM 2004 was integrated into the Design Workshop activities. These exercises helped us closely examine the content in context of the participating organizations. We had predicted there would be modules in the final training that would answer the perceived need for organizational-specific content, but when faced with the actual content, and challenged to strip it of statistics and other information that would not stand the test of time, the team rapidly came to consensus on the core sharable content. By taking full advantage of SCORM 2004 sequencing and navigation capabilities, we could have developed content for specific subsets of the target audience, but, with one exception, this was not necessary. During the workshop, participants experimented with the PMDB content, exploring the possible sequencing and navigation pathways through which a user might experience the course.

Imparting a high-level awareness of the implications of designing and developing to SCORM 2004 conformance was critical in helping the Design Team make informed decisions on the PMDB project. It
also created an informed nexus in this collaborative partnership capable of expanding awareness of the ADL SCORM initiative and its value to partner organizations.

By the end of the three days, we had reached agreement on key issues, such as the organization of the proposed content, instructional strategies, and basic look and feel. Several key preferences drove instructional strategy development (though the last two were later modified):

- Scenario-based training
- Realistic job examples
- A short game for extra practice
- No pre or post-test
- No “forced” content
- Credit without “experiencing” all content, if final assessment passed.

More importantly than the specific decisions reached, we found ourselves unified in a common vision, and parted in a spirit of teamwork and cooperation.

**Refining the Design**

A Design Concept was crafted, detailing all aspects of the final training product from lesson structure to activity tree showing course organization and sequencing rules, to interface design, and development specifications. We made critical decisions in consultation with the subject matter and technical experts to optimize the content for reusability, and be creative in presentation and instructional strategies. In order to minimize rework later in the process, we continued to surface concerns, clarifying them until all agreed on workable solutions.

We used a rapid prototyping approach which meant developing a portion of the course concurrent with the refinement of design ideas. This allowed for demonstrating proposed instructional strategies, “proving” various development assumptions, working out potential development bugs, and performing preliminary SCORM testing. As the content was still being finalized and storyboards were yet to be written, all activities, media, and content chosen for the prototype were placeholders, but helped team members visualize and agree upon a solid design for the final training software.

We began the prototype planning by brainstorming with the primary subject matter expert. What immediately became obvious was that using a scenario-based instructional strategy would drive prototype decisions differently than if we were following a more traditional lecture and knowledge check model. We wanted to explore how all the anticipated types of learning activities would be programmed, including the more ambitious activities, such as scenarios with multiple decision pathways. The breadth of the prototype was defined by the need to design and develop several aspects of the training, using very limited portions of content.
Concurrent development of a prototype and the design specifications themselves resulted in at least one critical instructional strategy course correction. Just before the first version of the Design Concept Report went out for comment, the content and technical subject matter experts viewed the prototype in a web conference. Able to imagine for the first time how it might flow, they decided that accreditation authorities would be more likely to accept this course if we could say that all screens had been “experienced” before attempting the final assessment. Several internal design sessions were needed to clarify the extensive SCORM implications of this change in requirement. Where freedom to move directly to the final assessment had translated into very little sequencing of the user’s experience, we now needed to “channel” the user through every screen prior to allowing access to the final assessment.

Use of the PMDB course as a tool for credit would not have presented any special challenges had there been only one stakeholder organization. However, with multiple stakeholders and the potential for differing thresholds for passing, we needed a way to differentiate users. The solution was accomplished by requiring users to select an organizational affiliation on the first screen of the course, and SCORM 2004 sequencing supported the correlative scoring process.

A different challenge surfaced and was handed off to the VA for resolution about this time. Similar to other organizations, the VA has a directive for online media, including instructions for training delivered on web pages. This directive set forth stipulations about “branding” each page as the property of the organization and providing links specific to the VA. The PMDB project, by its very nature, could not support compliance with this directive, and delivery via an LMS was certainly not the context for which the directive had been written. Comparing the directive’s assumptions and instructions with the goals of the collaborative PMDB training venture produced a stark image of just how fast technology can change our operating environment. The VA is suggesting that the burden for this “branding” shift from the courseware itself to the LMS, a solution that supports sharability of courseware and leverages LMS capabilities.

As the target audience includes employees with disabilities and the training was to be delivered online, this training needed to be compliant with Section 508 of the Rehabilitation Act as amended by Congress in 1998. Section 508 is open to wide interpretation. The stakeholders resolved that we would accommodate color-blind and hearing-impaired users, as well as the sight-impaired wanting to use a screen reader. Users set these preferences on the first screen.
Taking the design from thoughts and ideas to developed courseware has depended upon the collaboration and professionalism of all involved. Many lessons learned could easily have been lost if they had not been captured and made a permanent part of the project records. Specific attention has been given to the critical success factors for working with multiple stakeholders. The following three sections are the observations of the third-party design and development experts, rather than the perspective of the whole team.

- “The ‘How’ of Our Success” delineates major project phases and the strategies that were most effective in moving through them.
- “Lessons Learned” documents what we consider best practices, whether discovered during this project, or already a part of our process.
- “A Cautionary Tale on the Design of Sequencing” offers an observation about the complexities of SCORM 2004 not readily apparent to first-time developers.

We hope the information in this document will serve the overriding goal of this project — to demonstrate that disparate organizations with multiple agendas are capable of collaborating in substantive and productive ways to bring educational value to all their members.
The “How” of Our Success

A project as ambitious as this one could have been derailed at many critical decision points: obtaining key stakeholder buy-in, identifying appropriate points of contact, and establishing and maintaining schedules and expectations for deliverables. High instructional design standards were a value held by all team members. Our process consisted of these phases: Analysis, Design, Development, Implementation, and Evaluation. Critical success factors, as they relate to each phase, are described below. Clear and consistent communications were vital from the beginning to the end of the project.

**Analysis**
~ Identified requirements early, with participation from all stakeholders ~ Allowed ample time for review, questions, and comments on analysis and resulting design implications ~

**Design**
~ “Pushed” issues until they were completely clarified and agreed upon, preventing misunderstandings and costly rework ~ Held regular sessions, often through web-conferencing, to work out design topics ~ All design team members were active and involved in providing input and feedback ~ Reached design decisions guided by defined requirements, sound instructional principles, and design team ~ Nurtured intensely collaborative effort, initiated at the Design Workshop and fueled by consistent communications ~ Reviewed storyboards in face-to-face session with the primary subject matter expert ~ Collaborated on media production shoot ~

**Development**
~ Staggered production milestone dates to review the training in stages, rather than waiting for the entire product to be finished ~ Posted a schedule of production milestones ~ Offered support for anyone having trouble using the delivery vehicles ~ Encouraged input and testing of product iterations, accepted comments in all forms ~ Tracked bugs and alterations in change tracking software ~ Conducted testing in an iterative development cycle ~

**Implementation**
~ Addressed implementation issues early, particularly those resulting from full application of SCORM 2004 sequencing and navigation capabilities ~ Invested extra time and effort in resolving LMS issues ~ Kept stakeholder and contractor communications open and frequent regarding these challenges and their resolutions ~

**Evaluation**
~ Evaluated the training at Kirkpatrick’s 3rd level to assess whether learners have generalized what they learned and applied it in their daily work environment ~

The formulation of this case study and lessons learned document forced the team to objectify and annotate its efforts. This has resulted in a more transparent process and increased communication between stakeholder and project team. Virtual work can often be dull, but this project maintained a lively tempo of activities with numerous opportunities for both virtual and actual contact. It would appear that the most important best practice — clear and frequent communication — has proven to be at the heart of this successful project. Nurturing these interagency relationships was not only essential to the outcome of PMDB, but to the development of a network that can work collaboratively to apply the same model to other relevant courseware.
Lessons Learned

The Application and Refinement of Best Practices

The lessons learned in the process of working on the PMDB program, including the best practices we followed, are organized into two categories: 1) working with an Interagency Design Team comprised of multiple stakeholders who are geographically dispersed, and 2) designing and developing for SCORM conformant content. While some are true lessons – learned through problem-solving during this project – many are the confirmation of best practices developed over time.

The issue of time – allocation of it in the proposal stage and management of it in the project phase – was a major element in everything we did. Designing and developing SCORM 2004 conformant content with multiple stakeholders presented obstacles and opportunities that could not have been predicted, some of which are no doubt unique to this project. All will be taken into account in our next venture. The most critical best practice associated with time: buy as much of it in the beginning as you can, then establish and manage expectations of how it is to be spent, engaging in consistent and persistent communications throughout the project.

Flexibility, trust, and communication proved to be the critical success factors. The PMDB project was fortunate to have stakeholders who were enthusiastic, focused, and involved. They encouraged exploration of SCORM 2004 capabilities for application to this project. As a result, trust quickly developed among all team members, creating a productive and creative work atmosphere. Everyone remained open and enthusiastic about innovative thinking, whether it was in response to necessary workarounds or just better ideas as the project evolved.

Interagency Design Team

~ Engage a Neutral Third Party ~ In order to foster the spirit of collaboration and relieve pressure from any one member organization, engage a neutral third party with both facilitation and technical expertise in the design and development of training.

~ Define Criteria for Success ~ Establish the criteria for overall project success at the Kickoff Meeting, while everyone is focused on the big picture. Naming these criteria – requirements for the project itself – sets expectations against which the whole will eventually be measured.

~ Select Appropriate Design Team Members ~ The Design Team is integral to all project activities. When multiple organizations are involved, working with a subject matter expert and training representative from each organization is recommended. Ideally, each member should commit for the life of the project. Changing members, while occasionally inevitable, can cause havoc with continuity of design decisions and consequent project delays can be debilitating. This is particularly challenging when representation must be from multiple organizations and there may be only one opportunity to meet face-to-face.
~ Encourage Stakeholder Consensus and Buy-in ~ Prioritize stakeholder objectives. There are going to be multiple agendas in a collaborative project, and some will be conflicting. Identifying the most critical stakeholder objectives and looking for win-win-win situations fostered buy-in from all participants.

~ Assign Final Authority ~ Establish one point of authority for final say on controversial decisions. Consensus on who will hold this authority must be reached early on – preferably at the Kickoff Meeting, and the mechanics of decision-making should be clearly delineated.

~ Manage Stakeholder Input ~ Ask for stakeholder input early and often. Take into account both regular holidays and times when stakeholders are traditionally very busy. We published review periods that gave generous time for review and response to mitigate the risk of losing critical input.

~ Maximize the Design Workshop ~

> **Scheduling:** Weigh the pros and cons of when to have this event. There was perceived value in scheduling the Design Workshop as soon after the Kickoff Meeting as possible to continue building momentum. The advantages of doing so were offset by the preparation necessary to ensure we would make the most of the time together. On balance, we might have found it useful to schedule more time to deal with the requirements and existing content prior to the workshop.

> **Teambuilding:** Don’t underestimate the importance of rapport. It is critical to program at least one short teambuilding activity. We chose a pair activity exploring avocations to encourage follow-on conversations that could range far beyond the project.

> **Requirements gathering:** Get them all and get them early. Had it been possible to share all the proposed requirements with team members prior to the Design Workshop, some action items might have been unnecessary after the event. With this project, as it turned out, this was not a major obstacle, but if there had been more sharply divided preferences, it would have been wiser to have them all on the table prior to the workshop. As it was, a few surfaced later in the design cycle – perhaps an unavoidable reality.

> **Requirements approval:** Include review of the requirements and actual sign-off early in the workshop schedule. This moved us forward with design and built the team’s understanding of each other’s organizational constraints.

> **Content gathering and revision:** Schedule the initial revision of content prior to the workshop. Significant decisions about the way to sequence and organize the content were made during the workshop. However, the content was due for updating and so, by the time the Content Outline was delivered several months later, it had undergone dramatic revisions. These revisions necessitated rethinking design decisions that were a “done deal” in the minds of the Design Team. It would have been better use of everyone’s time at the workshop if the content had already been through revision.

~ Make Project Materials Accessible ~ Provide the most intuitive ways for Design Team to interact with project materials and each other. A password-protected website provided access to all posted deliverables, but stakeholders were unable to manipulate documents while on the website. A web portal would have been even better – one with a single login that supports direct feedback from multiple
stakeholders on postings (by means of tracked changes and version control), as well as a discussion board to support team communications and status updates.

~ Maintain Open Communication ~

> **No stovepipe:** Spread the responsibility for communications as appropriate to the situation. Programmatic issues were handled by the Project Manager, while production issues were the purview of the Course Lead. However, specific situations were also addressed directly by graphic artist and/or programmer. Expectations were set early on to manage, as opposed to control, communications. The stakeholders established similar communication lines within their organizations.

> **Regular communications:** Be accountable. We established expectations for the flow of information, limiting “scattershot” emails, and maintaining as transparent a process as possible.

> **Plan for newcomers:** Don’t re-invent the wheel when newcomers join. Turnover is inevitable in any project. We planned for this by developing a Project Binder with tabs for every deliverable as well as schedule and important reference materials. Additional copies were sent to new members as an orientation tool.

~ Review Developing Courseware Regularly ~

Investigate access for all. Since completed SCORM 2004 conformant content must be delivered via a Learning Management System (LMS), the prototype could not be burned to a CD or emailed in any way that would be operable. Providing access for multiple stakeholders in the review stages prior to LMS implementation was a significant challenge. ADL’s Sample Run-time Environment (RTE) was the intended vehicle for review, but some Design Team members were unable to successfully install it, perhaps due to security precautions within their organizations. While the prototype remained relatively concise, we were able to offer web-conferencing sessions for review of the prototype and successive iterations. Once the training was packaged for loading on an LMS, it was available via the contractor’s LMS, and was also available for loading on anyone else’s LMS. However, LMSs are not always as ready for SCORM 2004 conformant content as they advertise, and over the lifetime of this project, this issue remained a challenge.

~ Provide Product Demos ~

Consider Captivate or other comparable software. In the age of CDs and wireless access, it was disconcerting to be constrained by the complexities of LMS technology. To support the stakeholders’ goal of demonstrating the training at meetings and conferences, we would in the past have burned a CD with all requisite files or provided the link to a regular website, but this doesn’t work for SCORM 2004 conformant content. Instead we created a screenshot “canned” demonstration using Captivate. While this was better than nothing, it proved tricky to demonstrate some of the more innovative aspects of the training, particularly the evidence of sophisticated sequencing and navigation.
Designing for SCORM Comformant Content

~ Balance Identified Audience with Potential Future Audience ~ In the case of training which is being designed to maximize potential reuse, a balance between the identified current audience and the profile of potential future audience(s) needs to be reached. This may entail making concessions which do not negatively impact the user experience in the short run, in order to increase the likelihood of reusability in the future.

~ Plan for Reuse and Sharability ~ Time spent getting clarity about sharability and reusability up-front is time well-spent. Particularly if you are working with multiple stakeholders, it takes effort to coach them on the potential and nature of designing for reuse. They need to determine what is and what is not sharable content in general, as well as in their own particular cases. The payoff will come in development. If the activity tree truly reflects the educated wishes of the stakeholders, development can proceed with minimal unexpected set-backs.

~ Organize Content for Reusability ~ When converting legacy content, organize it to create context-neutral chunks with an eye towards reusable learning objects. The original PMDB PowerPoint® slides had been accumulating over a number of years and required consultation with the subject matter expert to determine a new logic.

~ Size SCOs Appropriately ~ Consider pros and cons of sizing your content into Sharable Content Objects (SCOs). Small SCOs may increase the potential for reusability, as long as they are self-contained units of instruction and tagged with metadata that allow for meaningful retrieval. While there are many trade-offs involving reusability vs. user experience, one unexpected lesson learned involves the disconcerting experience of clicking “Next” and having the screen appear to navigate away from the current module. This is simply the action of a SCO being closed and a new one being opened, but takes a little getting used to. As LMS technology matures, this particular issue will most likely become transparent to the user.

~ Give the Prototype Purpose ~

> XML: If time allows, the storyboarding should be completed before the XML schema are finalized. In the PMDB project, we generated our content dynamically through XML. Once the content-free prototype was working well, the developer wanted to have all the elements of presentation in order to create the XML schema. This was concurrent with the beginning of the storyboard phase. To avoid costly rework, he pressed for the elements of the training (mini-lesson, drag/drop, knowledge check) laid out in their relative order. This was in direct conflict with traditional waterfall design and development and may always be a challenge when not only content but issues of presentation have yet to be finalized. A healthy tension grew between the pressure to generate a prototype and the desire to remain open and flexible about presentation.

> Level of functionality: Manage stakeholder expectations about prototype functionality. In the PMDB project, the prototype proved a valuable tool for increasing stakeholder understanding, buy-in and enthusiasm. Determining exactly how functional it would be, and what it would contain as sample activities, was not communicated as well as it could have been, both internally and externally.
While the choice of activities might have been unclear at first, an explication of the prototype’s functional aspects (sequencing and navigation) should have been detailed in the proposal stage.

> Access to prototype: In the case of PMDB, stakeholder LMSs were yet unprepared to host SCORM 2004 content. We had assumed stakeholders could view the prototype using the ADL Run-time Environment (RTE). Having worked extensively with the RTE, the development team was unprepared for the number of problems that stakeholders experienced in downloading it, often due to organizational firewall constraints. Be prepared to provide alternate access and spend project resources to host it, such as web-conferencing.

~ Scope for Metadata ~ Industry-specific taxonomies are still in their infancy, and educating both stakeholder and the development community on their use is a necessary step if reusable learning objects are to be truly reusable. As with any other aspect of a project, planning for metadata needs to be included in budget and scope and addressed in the early design stage. As EES is in the midst of creating metadata requirements for the VHA and promoting the design of a standard taxonomy for the healthcare training community, this project was not scoped for more than the metadata required to ensure functionality, but the concept was included as part of the Design Workshop.

~ Maximize Efforts of the Development Team ~ Brainstorm early and often. Traditional ISD process presupposes that the instructional design can be completely visualized and articulated by the instructional designer and then handed off to the graphic artist and programmer. In this project, the instructional designer consulted with the programmer, but as both were dealing for the first time with the full ramifications of SCORM 2004 functionality, this occasional consultation should instead have been several scheduled, formal brainstorming sessions. The activity tree developed for the Design Concept Report ended up going through several critical revisions as the prototype was being developed, occasioned not only by changes in stakeholder requirements, but also by deeper analysis of the original activity tree over time. Some re-work might have been avoided had the internal team worked this earlier.

Developing for SCORM Conformant Content

~ Tap Available Technical Resources ~ Locate and integrate all possible resources for technical assistance. The ADL community is interested in advancing technical expertise among those who are generating SCORM 2004 conformant content. Their support was solicited near the beginning of this project to critique the proposed activity tree and later to help sort out a few development issues impacted by sequencing and navigation. A valuable body of knowledge and opinion is growing within the online community of designers and developers.
~ Determine Section 508 Strategies Early ~ While not strictly speaking a SCORM issue, if the training is to be SCORM 2004 conformant there is a good chance it will be delivered online and may fall under the aegis of Section 508 of the Rehabilitation Act as amended by Congress in 1998. Determining the stakeholder’s criteria for compliance should be handled at the Design Workshop if not before. Most of the programming in support of this was not influenced one way or the other by SCORM 2004. However, in the case of users unable to manipulate a mouse, our idea was to use sequencing rules to “serve” them an alternative multiple-choice exercise any time the original activity was drag and drop. Other constraints led to placing a “hold” on this accommodation, but we plan to implement the idea in upcoming projects.

~ Prepare for LMS Implementation ~

- **Growing pains:** Plan for problems. SCORM 2004 is new enough that LMS organizations have less than comprehensive experience with a wide variety of scenarios. Consequently, loading and testing files that have passed the ADL SCORM 2004 Test Suite should occur as early in development as possible, to allow for the inevitable delays in working with LMS technical support staff. Reaching the right people, analyzing problems, monitoring to confirm that they have been successful – these things can take a great deal of time. Add to that the fact that this project is to be delivered on multiple resident LMSs and the challenge increases.

- **LMS vs. inter-SCO navigation:** Program for all “back/next” navigation to occur within the SCOs. In order to avoid user confusion – presenting them with two potential navigation pathways – do not make use of the available compatible functions in the LMS interface.

- **Content display:** Be ready for surprises. The LMS will “read” the manifest and display content in its environment according to its own protocol. Unless you are experienced with a particular LMS, it will be difficult to predict how an LMS will display such things as the course menu. For example, we were surprised to find that, while the menu looks the way we intended in the ADL Run-time Environment, it is displayed in two ways in the test LMS. One of these displays shows a long list of active links (more than we wanted visible in the menu) and yet clicking does not bring up the associated piece of training – instead, it opens an information screen in the LMS. There is no known workaround for this, at least none that would be persistent in all LMSs.

- **Completion status screen:** Keep learners informed of progress. The learners need to have some idea of progress, not only within a module, which we accomplished with a progress bar, but in terms of which modules are completed and which remain. Since our LMS did not indicate course progress, our solution was a “dummy” SCO (devoid of course content), that queries the other modules for completion and presents this information to the user on a single tracking screen whenever a module registered complete.

- **Multiple assessment attempts:** Know your LMS. Once a passing score has been attained, the number of repeat attempts that will be allowed in any particular LMS is a function of the LMS, not the course design.
Limit new technologies, if possible: The learning curve for developing to SCORM 2004 conformance should not be underestimated. To the extent possible, limit the use of any other new technologies that add their own challenges. In this project, we upgraded to a new version of FLASH in order to have more flexibility producing alternate access for disabled users. The double learning curve was unavoidable.

A Cautionary Tale on the Design of Sequencing

There is no way to plan for every eventuality in any project, and there is no specific lesson learned for what happened with sequencing design. However, our experience may be instructive to others in terms of the impact that sequencing can have on design, and the need for a fresh design mindset when working with SCORM 2004.

The biggest design surprise in this project came when we realized the cascading impact of a “simple” change in plans, brought about when the subject matter experts concluded that the training would be more acceptable as a tool for accreditation – one of their primary goals – if the user was led to “experience” every screen. This meant our initial sequence-free movement through the training – directly to the final assessment if the user so desired – had to be redesigned.

In our original design, based on the consensus reached in the Design Workshop, we emphasized the scenario-based practice portions over a more traditional lecture/knowledge check format. This presented the challenge of how to make the content from the original course available if and when a user might want it. We decided it would be accessible from “inside” each of the practice modules. The user would merely click an onscreen tab labeled “Tutorials.” In keeping with it being a resource rather than the primary focus of the instructional strategy, we added a topic list and keyword search functionality.

In this design, the SCORM sequencing was simple. The user would be “forced” into the introduction, but once that was completed, all materials would be available, including the final assessment. The tutorial material was going to be pulled from source files (assets) into the interface of the practice modules, as needed for reference.

Just before the first version of the Design Concept Report went out for comment, the content and technical subject matter experts decided that accreditation authorities would be more likely to accept this course if we could say that all screens had “experienced” before a user attempted the final assessment. All agreed on the wisdom of this design change, but underestimated the impact this would have on our activity tree.

We held several internal design sessions over the next few weeks, getting clear about the SCORM implications of this change in requirement. Our decisions may prove instructive to others balancing similar issues, especially as we worked our way from a very simple, non-sequenced design into a complex linear choice design.

SCORM Impacts

After the intro was “experienced” by the user, we wanted everything except the final to be visible in the LMS menu. In order to accomplish this, we clustered the intro together with all other modules except for the final, and assigned a completion objective that would then “reveal” the final.

We needed to redesign the practice modules and how they work with the tutorial materials. We made the tutorials a stand-alone module that could be accessed after the intro and worked through from start to finish (one SCO), but continued to make it available from inside each practice module. So both stand-alone module and practice modules pulled from the same asset source files.

The question of “chunking” the content for reusability had to be reconsidered. We decided that reusability would occur at the module level – modules with multiple SCOs can be reused as one unit. While it logically makes sense to reuse the whole course, we constructed it so portions COULD be repurposed alone: just the practice modules, just the game, or just the tutorials.
Acknowledgements

The PMDB training program and associated deliverables were developed as part of joint VHA and U.S. Navy project entitled Collaborative Health Training for Federal Organizations under the Navy Shore Infrastructure Transformation (NSIT) program. The purpose of the project was to develop a SCORM conformant healthcare-related training course that can be shared across multiple federal agencies.

Credits

The success of the PMDB project is directly attributable to the professional men and women who participated in the design and development of the course. Their commitment and willingness to cooperate, while taking ownership within their organizations, has been key. We have met with exceptional problem solving ability, technical prowess, and professionalism in all aspects of the project, but would especially like to thank the Design Team for their invested time and dedication to creating a quality product.

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U.S. Air Force
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