

Sharing Learning Content: Beyond the Technology

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ABSTRACT

The vision of the Advanced Distributed Learning (ADL) Initiative is to, “Provide access to the highest quality education and training, tailored to individual needs, delivered cost effectively, anywhere and anytime.” The terms “Provide access” and “cost effectively” are a focus for ADL in helping to make learning content more shareable. Reusing learning content has many obvious benefits (e.g., cost-savings, less duplication of effort, faster development time, and greater access to excellent material). However, the history of projects that reuse learning content is a mixed bag—some show great promise while others seem to hinder sharing. The issues surrounding shared content are broad, but can be characterized by looking more closely at human and technical hindrances. This paper reviews prior efforts within the DoD to share learning content and proposes a practical way forward for the DoD.

ABOUT THE AUTHORS

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INTRODUCTION

Efficient processes are always a responsibility for managers and instructional designers. In an era of declining budgets for training programs, the need to be efficient is of increasing importance. One approach to making training development processes more efficient is through reusing existing materials. The reuse of existing materials is an aspect of systematic models of instructional design. Yet the ability to reuse instructional materials that the Government has already developed remains difficult despite prior efforts. What can we learn from these prior efforts to inform a productive way forward?

DITIS

We've been here before. In the early 90's, the need to share interactive courseware across the different Military Services was expected to increase as training budgets were expected to decrease (Fletcher, Wienclaw, Boycan, Bosco, & O'Neil, 1992). At that time, it was observed that all the Services taught basic courses such as electricity, electronics, hydraulics, and motor vehicle repair; it was reasonable to suggest that materials for these courses, or some portion of them, be usable by all the Services (Fletcher et al., 1992).

In an effort to facilitate the sharing of interactive courseware (ICW) the DoD established the Defense Instructional Technology Information System (DITIS) database and issued a policy (DOD Instruction 1322.20) directing use along with procedures for developing and managing interactive courseware throughout the life of the courseware. Submitting ICW information to DITIS required filling out a two-page paper-and-pencil form. There were roughly 4,500 titles in the DITIS database in 1992 (Fletcher et al., 1992) and there were still roughly 4,500 titles in the DITIS database fourteen years later (Shanley, Lewis, Straus,

Rothenberg, & Daugherty, 2009). While the database may not have facilitated the sharing of ICW as expected, the procedures for managing source materials and documentation throughout the life of the courseware remains a valuable guideline.

CORDRA AND THE ADL REGISTRY

With the introduction of the Web, a new approach to developing courseware was established in the DoD. The Sharable Content Object Reference Model (SCORM[®]) provided a set of specifications and standards to enable Web-based learning content to be interoperable and sharable among SCORM conformant LMSs. While SCORM provided guidance on how content should be packaged so that it could be shared, it did not specify how SCORM content could be discovered and accessed.

The Content Object Repository Discovery Registration/Resolution Architecture (CORDRA) was created to provide a model for how discovery and access of learning content could be enabled (Rehak, Dodds, & Lannom, 2005). The model was based on community-focused centralized metadata registries that were populated with submissions made by registered and locally governed content repositories (see Figure 1). The ADL Registry was the first instance of CORDRA and served as a central metadata registry for the DoD learning community. A policy introduced in June of 2006, DOD Instruction 1322.26, mandated that DoD organizations develop SCORM content and register that content in the ADL Registry. At the same time the Department of Veterans Affairs (VA), which provides training to more than 400,000 service providers (including clinicians, interns, contractors, and staff), signed into practice a policy commitment to build, store, and share content with other Federal agencies through the ADL Registry and other ventures.

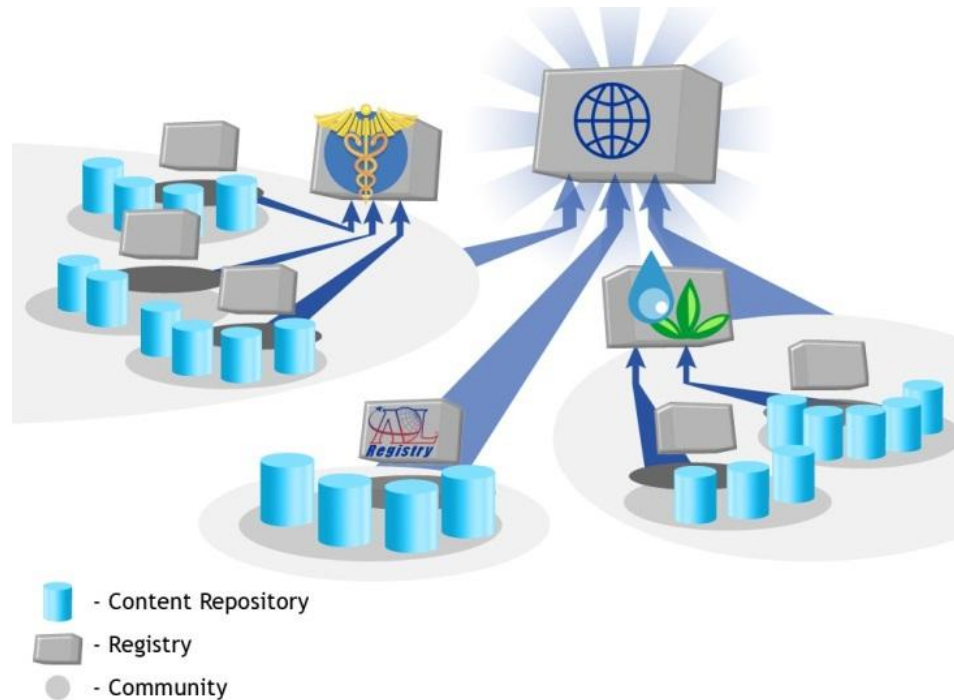


Figure 1. CORDRA and the ADL Registry

Registering SCORM content required creating and submitting Learning Object Metadata and ADL Registry Transaction XML files. If the XML files didn't conform to specified schemas, the submissions were rejected. Because submitting metadata to the ADL Registry was difficult, the hundreds of thousands of metadata records that ADL had hoped would come pouring into the ADL Registry never materialized. In spite of the policy mandate, roughly the same "success" rate was achieved as with DITIS. After five years, there wasn't much to **discover**.

However, a problem more severe than discovery was the inability to **access** content after finding its metadata in the ADL Registry. The problem was similar to finding a book title in a card catalog, but being unable to find the book on the library's shelves. The links between metadata records describing content and the actual content located in disparate content repositories was not constrained to any common business rules or access controls. The link was seldom a useful link as it typically just landed the searcher on the submitting organization's home page.

CONTENT REPOSITORIES

The CORDRA model assumed that Web-based content repositories existed when in fact it seems they didn't. Obviously, the content was stored somewhere, but

there was no logical or efficient way to access it. Indexing, or metadata tagging, was minimal at best and often nonexistent, hampering efforts within an organization to identify source materials for past or existing works and making sharing across organizations nearly impossible. Local organizations maintained idiosyncratic Learning Management Systems. The primary purpose of these systems was to deliver learning experiences to selected internal audiences. Some organizations also invested in Learning Content Management Systems. However, these systems primarily facilitated authoring content—not broad content sharing independent of authoring tools. Content repositories with the purpose of enabling content and its source to be uploaded and downloaded was the very limited exception rather than the rule. Users who knew the content owners might be permitted access to the content, but those who did not wouldn't even be aware of the content—re-use isn't possible without discovery and access. The showcase exception is the MediaTrax repository and associated practices for managing Naval Aviation Maintenance content. The CORDRA model of federated content repositories may well be the ideal model, but in order for this model to be realized, content repositories that are based on common access mechanisms must be in place.

Content repositories are a logical next step from a technical perspective in the journey of enabling

learning content to be discovered, accessed, and used or reused. Several efforts are underway to provide open source content repositories that can help establish and exercise common business rules. These projects include the ADL 3D Repository (3DR), the Re-Usability Support System for E-Learning (RUSSEL), and the Department of Veterans Affairs Exchange. Each of these is or will be an open source content repository. The ADL 3D Repository was limited to enabling 3D models and their source to be uploaded and downloaded. However, best practices including easy upload, content previews, access controls, and enabling content to be converted to preferred formats on download seem to be desired features for repositories managing other content types (Regan & Chadwick, 2011). RUSSEL is a project under development to explore these and other practices for more general e-learning content. The VA's Exchange represents an effort to explore sharing practices for general e-learning content. This project leverages the VA's formal healthcare sharing network which presently includes fourteen federal agencies and includes the Uniformed Services. Their approach tries to follow a *pull* rather than a *push* philosophy, pulling content to respond to demonstrated needs whenever possible rather than solely offering training designated as sharable. This work has effectively demonstrated content re-use and subsequent cost avoidance through shared training.

HUMAN PERSPECTIVE

While the focus on content repositories seems to be a next step from a technical perspective, a different picture emerges if we switch to a human perspective. The reluctance of content owners to upload their valuable content to yet another shared system is understandable. While a content owner from a corporation may have a non-competitive work environment and see the value in avoiding costs by reusing content through a central system, owners from military and university organizations may not feel comfortable uploading their content to a system that allows access from users they don't know (Strijker, 2004). Military content owners are likely concerned about information security. University content owners are likely concerned about simply giving away their valuable intellectual property – of course, military contractors are worried about this too and the business advantage their labors represent. Healthcare content owners such as the VA or DoD's Medical Education and Training Campus (METC) are always concerned that standard and best practice model procedures and techniques are not tampered with, that outdated methodologies are not propagated, and that liability

concerns are addressed. These are all valid concerns that currently greatly limit sharing within or among these communities.

The military content owner concerned with information security needs clear procedures and fixed rules to make his or her content discoverable and accessible. Use-rights and copyrights need to be maintained and managed. The military contractor needs a clear contract that is written to ensure the Government owns the content and its source to support life cycle maintenance. All content owners need consideration for their motivation. And finally, asking content owners to upload content to a repository that may be complex or require them to fill out unclear metadata forms to help others discover their content is likely to be met with resistance.

GROWING THE SHARING COMMUNITY

Creating a positive disposition toward content re-use must include several factors:

- (1) Choosing to create content that is meant for sharing,
- (2) Promoting processes and policies to search for content to re-use in internal development and
- (3) Participating in pioneering content reuse efforts by risking organizational and personal time, effort, and ownership.

Although these are overt practices, to a great extent, they are driven by attitude. Creating an attitude of sharing will change the way we do business—and that change will be hard won. Attitude makes the difference. It begins with individuals; if it is beneficial it spreads through relationships and quickly becomes organizational.

Machines and systems just make processes operational, but systems should facilitate the processes without much interference—they should be transparent.

Early Adoption

Technology innovation models classify innovation adoption, like content sharing technologies, into four audiences:

- (1) Innovators,
- (2) Early Adopters,
- (3) Late Adopters and
- (4) Laggards.

If you are reading this, you are most likely either an innovator or an early adopter. The Innovators are gathering. The idea is widespread and popular and the practice of re-use and sharing is growing. The next step requires a large scale attitude shift toward re-use. To do this we have to find ways to alleviate concerns over ownership, access rights, disengaging outdated content, and reducing or eliminating liability.

Early adoption is fueled by the reports of Innovator success and the promise of saved organizational and personal resources (time, effort, expense). When a training effort can substantially benefit from the use of existing content without sacrificing instructional quality and do so in less time or with less financial resources, then we will have reached the tipping point that unleashes the desired cycle of reuse depicted in Figure 2.

The question at that point becomes “why wouldn’t I participate” rather than “why should I.” The benefits outweigh the status quo. The tipping point is the confluence of many factors described below.

Volume of resources available for re-use

This is content that is readily discoverable, accessible and useful. The VA Exchange system will be seeded with more than 600 courses and an asset library of more than 26,000 items.

Ease of use

Any technology associated with the sharing of content should be easy to use. In this case, the repository

systems that facilitate the reuse and management of content must increasingly handle any complexities associated with reusing materials with minimum user intervention. Systems need to make uploading materials (final and source materials) simple and easy. Systems need to understand multiple file types to support content previews enabling users to *try before they buy*. Finally, systems need to be able to help users find content without requiring contributors to fill out complex metadata forms.

In addition, these systems must be easy to set up and operate with minimal support. Open source software options with installers and solid documentation also need to be available to serve as a baseline for effective content management. These systems need to implement standard Application Programming Interfaces (APIs) for integration with other repository systems, thereby enabling broad discovery and commercial innovation.

Clear procedures and business rules regarding sharing of content, with no room for interpretation, are also required. The explicit clarity in procedures and business rules will specifically help overcome any of the social barriers associated with content sharing as described previously. In addition to the clear procedures and business rules, equally clear consequences for breaking the rules will need to be developed and enforced to maintain the integrity of the system.

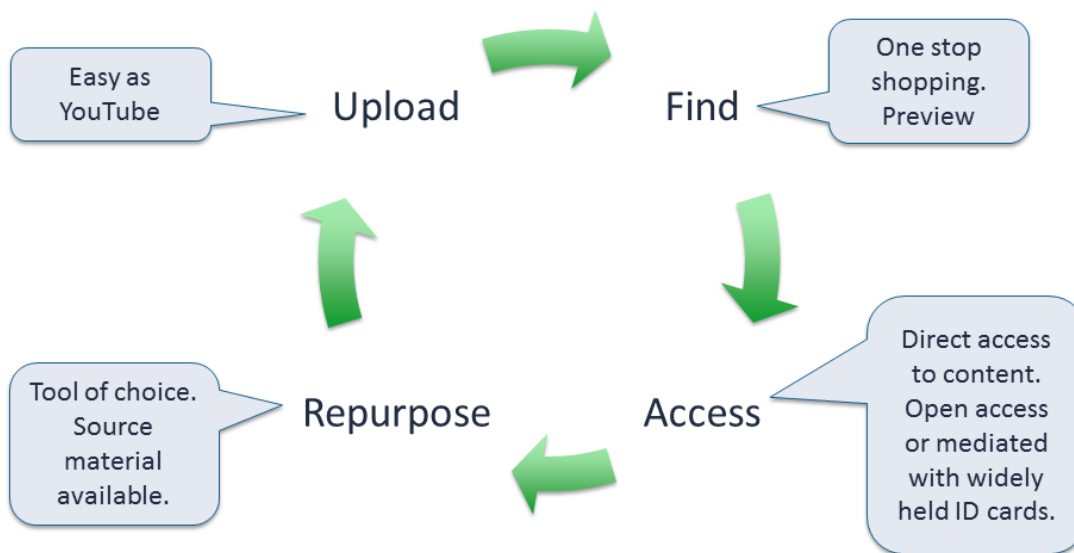


Figure 2. Desired Cycle of Reuse

Metadata

Metadata is to a cybrary as a card catalog is to a brick and mortar library; our repository is our cybrary and our metadata references are contained in our registry. Although the richer the references (metadata tags) the more accessible the content, tagging is time consuming and often requires subject matter expertise. A survey conducted a few years ago asked an audience of developers how many metadata tags they would be willing to apply to their courses. The result was a bell curve that showed that most would be willing to (without coercion) tag their content with 10-20 metadata tags. But content is significantly more discoverable with 40-60 tags. Discoverability is a function of metadata. To maximize discoverability the VA is employing a "Metadata Harvesting Engine." This tool harvests metadata from standard courseware documents such as LMS input forms and courseware brochures. The RUSSEL project will also include the capability to harvest existing metadata, while also supporting extensions for automated metadata generation. Finding ways to maximize metadata without overburdening developers, managers and Subject Matter Experts is critical to the adoption and use of sharing systems.

Human in the Loop

Some of what we've proffered in this paper is focused on technical, machine-dependant solutions. However, we recognize the importance of the human and social aspects of sharing and reuse. We all understand the importance of relationships. A key to maintaining any relationship is bringing something of value into the relationship. In this case, we're talking about bringing sharable content to a group of people who can effect change. As mentioned earlier, the VA has come up with a simple, human-interaction solution that works—with a cost avoidance of almost \$90 million a year! This human-interaction solution doesn't require a large up-front investment. Any community can realize massive cost avoidance by following this example, e.g., meeting regularly (building relationships) and allowing others to know what is going on in the realm of content development. It's easy to deduce that what may start off as individual relationships can quickly become organizational relationships as the sharing community grows. Even if we eventually develop the "perfect" machine solution, there will still be the need for the social aspects to perpetuate sharing.

Another good example is the Canadian Learning Registry (CLR). The CLR includes a social aspect in which planned content is posted, so that agencies within the Canadian government can prioritize their funding and avoid replication based on what's already been and what's currently being developed. DoD

needs to initiate a similar process. This process will help the Services avoid duplicative efforts—thus lessening duplicative expensive development costs.

It is also important to consider the intrinsic rewards for sharing with others in responsible ways. When the sharing is natural, content owners have the opportunity for self-satisfaction in "playing well with others" and saving precious taxpayer dollars. When the sharing is natural, content owners have the ability to control and be notified on how the content is being shared. It is difficult to make this sort of natural sharing possible through technical systems — although an easy-to-use, engaging, and effective technical solution would obviously make discovery and access much more scalable.

It seems wise to start by sharing content through face-to-face interactions and telephone conferences. That is precisely how the VA was able to share a large quantity of healthcare instructional content. In 2004, the VA's Interagency Sharing Coordinator began cataloging the inventory of training products that could be shared and forging an agreement with the DoD and later with other agencies (Twitchell, Seal, & Lynch, 2011). The sharing community, dubbed the Federal Healthcare Training Partnership (FHTP), grew to consist of eight organizations under formal sharing agreements and five working through less formal understandings. This approach yielded roughly \$80 million in cost avoidance for the year 2011 (Twitchell et al., 2011). The FHTP is now a consortia of 14 federal entities, which is managed by the Interagency Shared Training Group, a component of the VHA Employee Education System. This shared training enterprise instituted in 2004 has generated federal cost avoidance since its inception of \$318,346,000. The VHA/DoD cost avoidance from 2004 to date is \$122,747,000 of which VHA cost avoidance is \$46,420,000. At the end of third quarter 2012, FHTP sharing between these agencies topped \$84 million in cost avoidance. This effort is facilitated without a central repository or registry, with little staff, and almost no budget. The operation is hardly optimal, but with the advent of a sharing hardware and software architecture (Exchange system) in place, best practices will be provided for on-line repository searching, retrieval, review, commenting and easy download as well as metadata tagging and easy upload.

Access Controls

To ensure users gain and maintain trust in the sharing paradigm, processes, and system itself, appropriate access controls, along with a phased sharing approach are required. The first phase of this approach may be to limit access controls to internal DoD personnel only.

Following phases would then gradually build to more open sharing protocols (moving toward more public access to content).

An additional major effort to ensure successful sharing will be the verification of levels of classification for existing learning content. For example, currently the U. S. Navy Barber training content is tagged as For Official Use Only (FOUO). It appears that this is an over-classification and is the type of content that could be much more open. We recognize that some content will not be appropriate to open to a broader audience, but believe there is a large amount of training content that should be less constrained with regard to sharing.

CONCLUSION

The reduction or elimination of content sharing barriers (such as bureaucratic hurdles, taxing entry requirements, burdensome and time-consuming metadata tagging, etc.) will make distributed learning content easy to find, access, repurpose, and upload enabling training development to become more efficient. A unified, conscious effort by each of the Services at both the strategic and operational levels will be required for this content sharing strategy to be successful. The VA has achieved cost avoidance savings of close to 90 million dollars each year. How many costs could the DoD avoid with different attitudes, more cross-Service collaboration, easier-to-use repositories, and ultimately a more open and responsible environment for sharing?

We've discussed the current barriers to sharing and the importance of a machine-to-machine solution for sharing content. We've also discussed how we might overcome some of those barriers and the importance of human-to-human involvement to ameliorate sharing of content resources. In our experience, and from some of the examples we've shared, there seems to be a critical need for a human + machine solution. The human-to-human can start today, because there's very little up-front costs and the return on investment for DoD

overall could be significant. The machine solution will be down the road, and that will take some time and resources from organizations to achieve success.

Remember, you or your Service may not see a one-to-one, immediate return on investment from the time, energy, and sharable content you bring to the relationship with other Services. However, as the scales tip toward a more sharable environment, everyone will benefit. Your participation will help bring us to that tipping point.

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