

Role-Based Sequencing in a SCORM Environment

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Problem Definition

The Sharable Content Object Reference Model (SCORM) standards were born out of the Advanced Distributed Learning (ADL) Initiative to provide access to high quality learning content that can be tailored to individual needs and delivered cost-effectively, anytime and anywhere¹. Unfortunately, the SCORM 2004 3rd edition standards do not currently provide for sequencing of sharable content objects (SCO) based on the role or job function of the learner. As a result, multiple content packages are required to deliver customized versions of a course to learners with unique educational needs defined by their role or job function within an organization. Each of these content packages must be generated, conformance tested, imported into the Learning Management System (LMS) and subsequently configuration managed. Role based sequencing will allow for the creation of a single content package for each course that contains the learning content required by all target audiences. The result will be a reduction in the level of effort to deploy and subsequently manage the content.

Use Case for Role-Based Sequencing

On a recent military training program, the Northrop Grumman courseware organization faced a rather unique challenge; develop training courseware for multiple training curricula consisting of approximately 200 courses to be delivered to an initial 29 different target audiences and potentially growing to as many as 60 target audiences. Approximately 65% of the learning content is common across various groupings of these target audiences..

The table below depicts a typical course in these curricula. In this course, eight enabling objectives² (EO) have been defined for six target audiences.

- EOs 1 and 2 are common to all the target audiences.
- EOs 3 and 8 are applicable to target audience F.
- EO 4 is applicable to target audiences B and F.
- EOs 5 and 6 are applicable to target audiences C, D, E, and F.
- EO 7 is applicable to target audiences B, E, and F.

| Course XYZ | EO 1 | EO 2 | EO 3 | EO 4 | EO 5 | EO 6 | EO 7 | EO 8 | Total EOs |
|-------------------|------|------|------|------|------|------|------|------|-----------|
| Target Audience A | ✓ | ✓ | | | | | | | 2 |
| Target Audience B | ✓ | ✓ | | ✓ | | | ✓ | | 4 |
| Target Audience C | ✓ | ✓ | | | ✓ | ✓ | | | 4 |
| Target Audience D | ✓ | ✓ | | | ✓ | ✓ | | | 4 |
| Target Audience E | ✓ | ✓ | | | ✓ | ✓ | ✓ | | 5 |
| Target Audience F | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 8 |

¹ <http://www.adlnet.gov/about/index.aspx>

² To support deployment of the content to the target audiences, the courseware organization opted to develop each enabling objective as a separate sharable content objects (SCO)

Satisfying the unique training requires for each of the six target audiences for this course, would require the development and delivery of five content packages as follows:

- Package 1 – Target audience A
- Package 2 – Target audience B
- Package 3 – Target audiences C & D
- Package 4 – Target audience E
- Package 5 – Target audience F

The choices facing the courseware organization were:

1. Develop and deliver a unique course for each grouping of target audiences with the potential for requiring 1200⁺ unique courses each requiring a content package and associated conformance testing. Each of the courses would have one or more EOs common to one or more of the target audiences.
2. Develop a methodology to package and sequence all the learning content required by each target audience into a single course/content package. This would result in the need for just 200 content packages, one for each course.

For the courseware development group, the decision was simple, figure out how to include the learning content required by all the target audiences into one content package for each course.

While the decision itself was simple, implementing a SCORM 2004 conformant solution was very complex and required the developer to specify up to 50 objectives and pre-condition rules for each SCO. Templates in the authoring tool were used to make this process easier; however, the developer was still required to ensure the correct objectives and pre-condition rules were identified and the content adequately tested to ensure it executed properly for each target audience. The solution also required a customization to the target Learning Management System (LMS) to artificially set the value of an objective indicating the learner's role. One might ask "Why create such a complex solution that required an LMS customization?" It all came down to numbers. When the courseware development organization analyzed the number of courses that would be required by all the target audiences, the numbers were staggering. From a long term configuration management perspective, reducing the number of delivered courses/content packages was the clear choice even though the required LMS customization was contrary to the concept of interoperability. Had SCORM 2004 provided support for role-based sequencing, the above would have been much simpler for the developer to implement and a customization to the LMS would not have been required.

The above case is from a military training domain but other domains could also benefit from role-based sequencing. For example, if customer service training is offered to personnel working in a bank, a course could be designed that includes SCOs on the basics of customer service as well as SCOs peculiar to each position in the bank and the unique customer interactions associated with that position. Each learner would receive the SCOs that discuss the basics of customer service followed by the SCOs with information specific to the typical customer interactions experienced by the learner in their position.

Another example would be hazardous materials training. A course could be designed that includes SCOs that discuss general information about the precautions and handling procedures associated with hazardous materials. Additional SCOs would address precautions and handling procedures associated with specific hazardous materials. Each learner receives the general information SCOs followed by the SCOs on the hazardous chemicals in the learner's work environment.

What Can be Done About It?

The current SCORM 2004 standards allow for sequencing of content based on the value of an objective. The primary use for this model is to support the delivery of learning content based on the learner's needs. Those needs are determined through the administration of pre and/or post tests with the results being used to set the value of objectives. The objectives are then evaluated using sequencing rules to deliver the required content to the learner. Role-based sequencing can also be used to deliver learning content based on the learner's needs; however, in a role-based sequencing approach, the determination of what is presented to the learner is based on who they are rather than how they performed on a test.

To support role-based sequencing, a new data element and sequencing model will be required. The new data element (i.e., `cmi.learner_role`) would be used to store the learner's role and be available at runtime to support evaluation of sequencing rules by the LMS. The value of this data element would be established as part of the learner's profile much like LMS's currently set the value of the data elements `cmi.learner_name` and `cmi.learner_id`.

The current SCORM sequencing model depends primarily on the use of objectives. While objectives were used for the role-based sequencing approach described in the previous section, it was far from "simple" and required a customization to the target LMS. To support role-based sequencing, a new sequencing model will be required that allows for the use of data elements as opposed to objectives. The ability to evaluate a data element such as `cmi.learner_role` would enable role-based sequencing to deliver content to the learner based on who they are.

Summary

Role-based sequencing is nothing new. Courseware developers have been doing it for years with commercial off the shelf authoring tools. However, when the SCORM standards were introduced, a developer could no longer sequence content based on role and still deliver a SCORM conformant content package that was interoperable. It's time to take another look at the SCORM standards to determine if role-based sequencing has a future.