

This paper presents guidance regarding SCORM courseware presentation windows within an LMS, including the ALMS. The Saba LMS is used exclusively in this document however other LMSes will have the same requirements or requirements that will be satisfied by similar actions to the instructions provided in this document.

SCORM 2004 content windows in Saba:

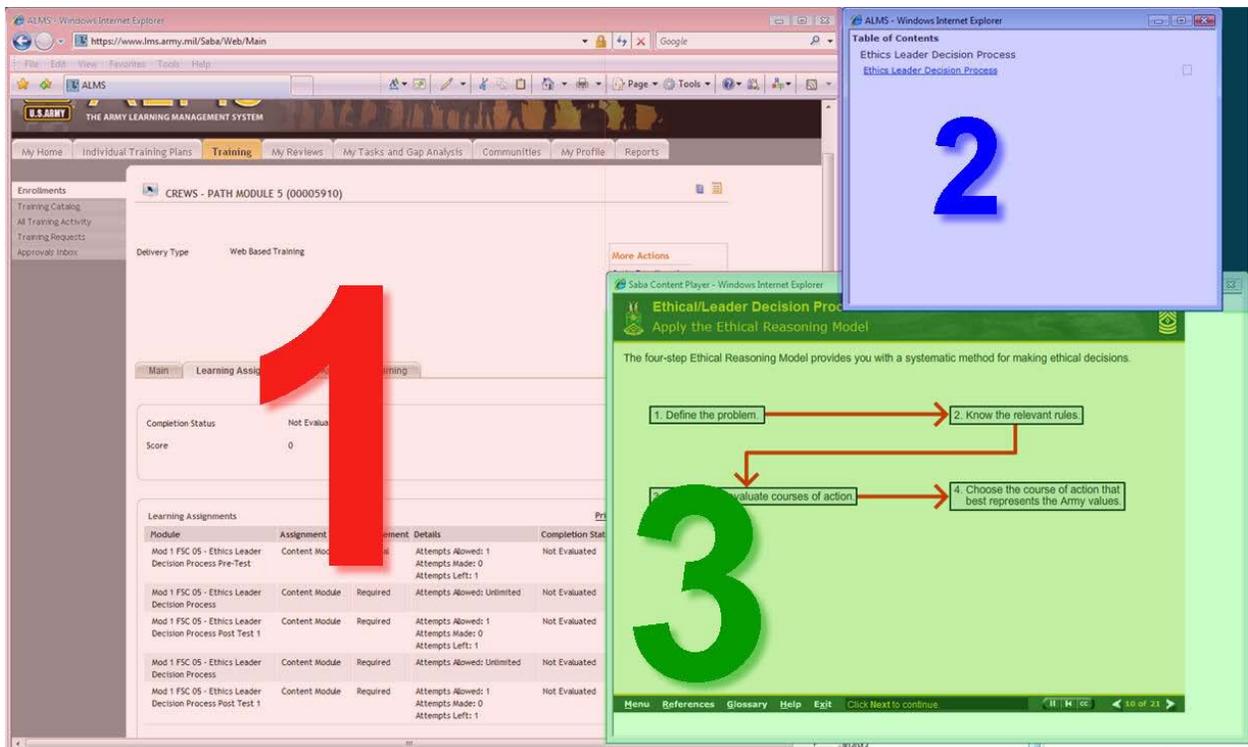
Presentation Overview:

The ALMS presents SCORM courseware using Saba Content Player Templates. The Army preferred Template is a plain 1024x768 window without the Saba Content Toolbar. Removing the Saba Content Toolbar removes all SCORM LMS User Interface (UI) controls and provides more white space for content. The preferred player will be presented in greater detail later so for now we will just establish that the Army and Saba provide a preferred SCORM content presentation template with the left panel displaying the LMS generated Table of Contents, all remaining space is available for contractor developed instructional content. Another option for content is to spawn a child and present content from the child window. The cost is responsibility to manage and control this child window. The benefit is the left panel landscape can be used to present content which increase the available display area for content. The Army recommends presenting content in the LMS player window in the right panel and not creating a child window.

Even with the recommendation that Army LMS content not open a child window, this paper will present the requirements and mandatory functionality when using the child window for content. The presentation of the more complex scenario will present the necessary instructions for the presenting the content in the frame of the Saba/LMS Player Window. The assumption is true in the case of the SCORM content windows since the child window (that is optional) is handled in addition to the parent window. The exit routine coded into the Saba/LMS Player Window must have a unique variable sent from the child window that when not set properly by the Child Window exit procedure that triggers the Saba/LMS Player Windows exit procedure to create and execute the proper SCORM communication messages signaling a request to exit the entire application. In both cases contractor created code that resides on the Saba/LMS Player Window and must catch exits that originate in 1 external child window and/or the external parent window. The tool set and techniques are similar, but the processing for 2 external windows requires sending similar messages with a different window identified.

The creation of LMS hosted SCORM content begins with the elementary information above (simple interaction with the LMS is mandatory and will always involve parent and child window). The simple interaction quickly becomes more complex when as a programmer you realize the demands of connected processing on the stateless Internet requires immediate allocation of tasks in the access defined hierarchical structure where the LMS tracks the user and the instruction identifiers but the content provides status and location and must verify most - if not all - necessary capabilities are supported by the current LMS environment. The required knowledge base required by SCORM content developers programmers continues to include **web application fundamentals** followed by knowing **proven Web page and Web site construction methods and practices**. The rest of this paper will provide information on additional demands resulting from the need to centralize the exit processing of three windows into one central location that you know will be triggered by an exit request from any of two other locations. Reviewing the information so far, in summary, the three windows available during SCORM content presentation to the learner are:

- 1) **The LMS window (This window has the launch control for a SCORM package).**
- 2) **The LMS generated window presents a Table of Contents generated from the SCORM package manifest file.**
- 3) **An (optional) child window (of the LMS Table of Contents window) that MUST be controlled by the content that resides in the LMS Table of Contents window.**



Three Windows is a crowd:

Two windows are mandatory in the presentation of SCORM content in the Saba environment. The first window, always the Parent window, is the Saba LMS Window (in this case if is the Saba owned window with a “launch” control linked to content object, a SCORM package in this case). The second mandatory window is the Saba/LMS Player Window. The Saba/LMS Player Window presents parsed manifest tags as the Table of Content (sometimes clickable links) and a default area for content to be presented.

For purposes of explanation the third window component in the presentation of SCORM content is the Content Child Window. The Content Child Window in the Saba 2004 Army player template is spawned by the content itself and is not controlled in any way by Saba or the LMS, in fact, Saba is unaware the Content Child Window exists. Content which uses a Content Child Window must use extraordinary measures to ensure proper and graceful exits occur under ALL closing scenarios. The two mandatory windows, the Saba LMS Window and the Saba/LMS Player Window, work in harmony and exit conditions for all learner exit paths are more easily controlled. The Content Child Window extends exit bounds beyond the natural Parent-Child vis-à-vis LMS-TOC scenario that is handled easily by Saba. The complexity is most easily handled with a communication system using variables that will be “tripped” when exit and close actions are performed in the child window. These variables are an essential part of the closing and exit actions coded into the Saba/LMS Player Window, the system close variables are used to signal the Saba/LMS Player Window routines that the child window needs action since the closing actions (for example, closing the LMS window by clicking the title bar “X” control) were initiated outside the Child content window and Child Window maintenance actions must be performed within the Saba/LMS Player Window.

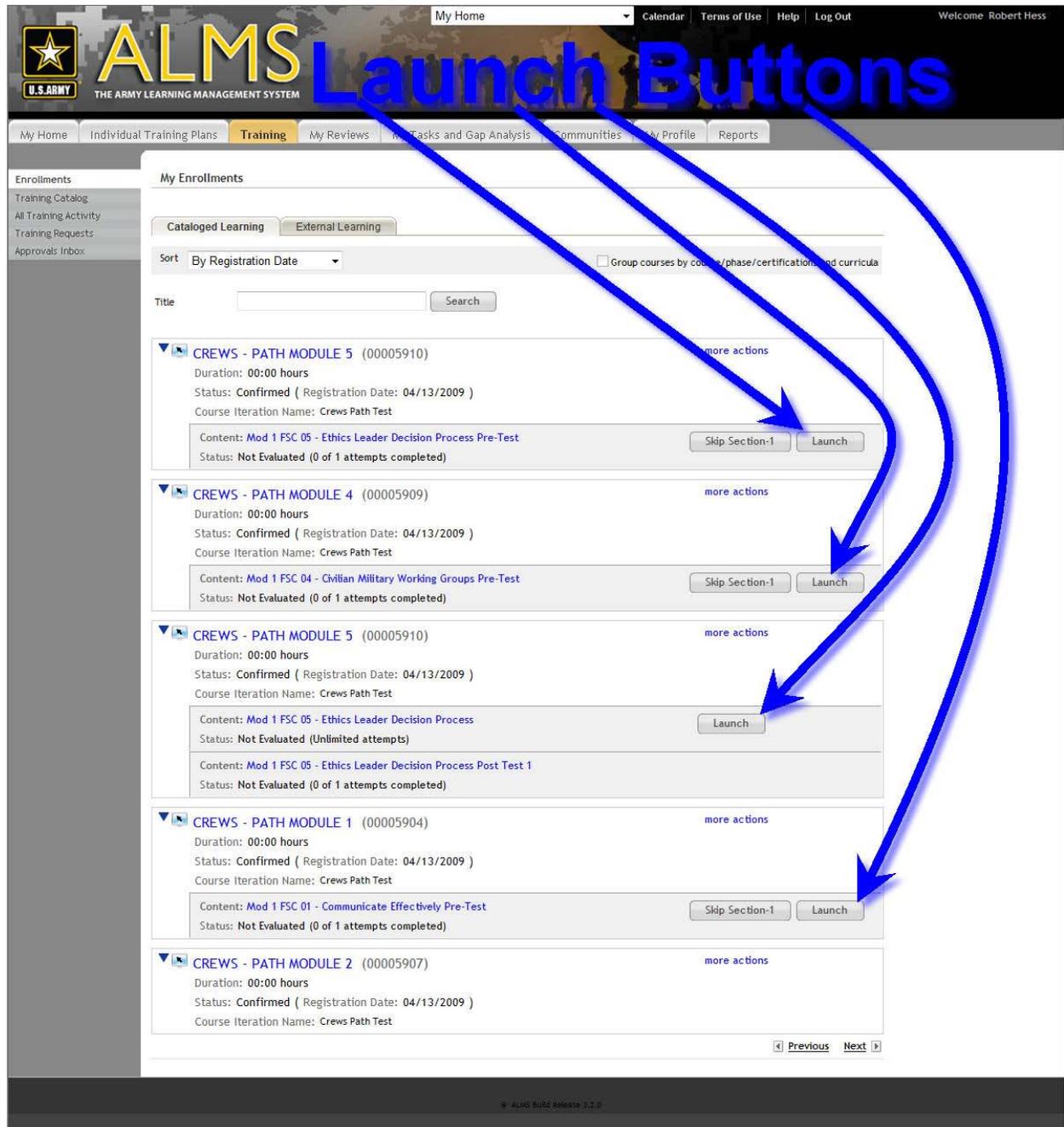
It is up to the content to centralize exit control into logical sensible SCORM shut down actions and provide the necessary communication to the LMS. This is done by providing graceful and logically sequenced steps in the Mainline Routines owned by the Content area of the Saba/LMS Player Window. The system variables mentioned previously are essential in the process to overcome the triplicate exit controls available to the learner. When an exit variable has not been tripped by the code in “normal” exit routines, the Saba/LMS Player Window is responsible to issue ALL the correct exit commands and provide any other processing to ensure a graceful exit is signaled to the controlling LMS. Alas, do not worry, this problem is more difficult to explain than it is to solve.

What to do:

These three windows are presented below with guidance and rules that are designed to ensure successful implementation in the Army ALMS Saba environment and deliver a consistently easy to navigate learning environment for all ALMS users.

The first window encountered by the learner is the Saba LMS window. SCORM Developers cannot control significant features of this window. Saba constructs SCORM packages into collections that learners register for, registration is the action that allows the learner access to the Saba LMS window which will host the all powerful “launch” control.

The Saba LMS window with launch buttons:



The second window presented to learners is the actual Saba/LMS Player Window. This window is where the SCORM Table of Contents is presented. Features of this window can be controlled by configuration settings provided by the Saba LMS. The preferred characteristics are:

- Size the window to 1024x768
- Remove the Saba Toolbar
- Show a scrollable Table of Contents
 - Left frame
 - Allocate 200 pixels

This player is titled “Army_SCORM_2004” and is available in the CVS and production Saba. Removing the Toolbar is consistent with the Army requirement that the SCORM LMS User Interface (UI) controls are not presented to the user.

The Saba/LMS Player Window with an open SCO presenting content:

The screenshot shows a web browser window titled "ALMS - Windows Internet Explorer". The main content area has a blue background and is titled "Feedback Test". On the left, there is a "Table of Contents" sidebar with a list of items and checkboxes. The main content area contains the following text:

Instructions: This course is setup to utilize the feedback button. Click on the small blue question marks on this page to learn a little more about the variables that are required for the proper operation of the feedback button. Press this link to download the code for this course.

Feedback Variable	Feedback data
Student Name:(studentName)	
The SCO:(scoName)	
The page number or location:(pageNum)	
The email address:(courseManagerEmail)	
The Courseware Title:(coursewareName)	
<input type="button" value="F"/>	Continue >>>>

SCO presentation options alter the function of the windows presented to a learner. When a SCO launches content into a child window the Saba/LMS Player Window becomes the “Saba/LMS Table of Contents Window” - the function of presenting instructional content is shifted to a child window. The child window is completely controlled by SCORM content.

At SCO launch time the developer has a choice of playing the content in the content frame of the Saba/LMS Player Window or opening another window, a content child window. Using a child window is a way to provide “full screen” landscape to the courseware. If the courseware design requires the full desktop the child window **MUST** be created.

Content Child Window:



SCORM 2004 Coding Requirements:

The learner may select any standard window exit control (the red X) at any time. Without trapping all exit events, SCORM content may not send the proper communication calls to the LMS which may result in lost results and a frustrated learner. The preferred JavaScript event handler to catch premature SCO exits (any non-standard exit that does not use child window provided scripts) from code within the Saba/LMS Player Window is “onbeforeunload”. Note that the Saba/LMS Player Window is the parent of the Content Child Window.

The code that executes in the “onbeforeunload” routine needs to take steps to ensure the LMS API calls will be processed correctly. This is done with a “noop” loop that will delay the end of the routine. This is mandatory to make the best effort that proper SCO exit processing will occur. An example of a complete “onbeforeunload” routine is included as Annex A at the end of this document.

When the content is presented in the Saba/LMS Player Window it is necessary to gracefully terminate the SCO, this may be done by using a global variable to indicate whether terminate has been called. The global variable should be set true during the standard exit processing contained in the content.

When content is presented in a Content Child Window an additional requirement is to close the Child Window during the processing initiated within the global variable trap. Closing all appropriate content created child windows is mandatory to clean up the learner’s desktop.

The [Army SCORM 2004 BRBP document](#) contains more detailed information regarding the proper usage of global variables.

Content Child Window Considerations:

The Content Child Window creates special circumstances which should be programmatically handled. User friendliness and correct processing requires coordinated communication signals between the Content Child Window and the Saba TOC Player window, that is the TOC window in this case (Saba/LMS Player Window). The Saba TOC Window is the Saba/LMS Player Window without a Content presentation panel

- Providing a course (package) exit button with an active Table of Contents requires the content child window to signal the Saba/LMS Player Window that the learner has requested to close the SCO **AND** exit to the LMS. When the Saba/LMS Player Window gains focus it will validate proper closing or perform proper closing of all content created child windows, validate proper setting or perform proper setting of all SCORM exit data, properly shut itself down and close itself which will return control to Saba and the Saba LMS “Proper” Window.

- *For self-directed content, that is, SCORM packages with no active (or learner selectable) Table of Content items, the learner should never land on the Saba/LMS Player Window. A learner that lands on the Saba/LMS Player Window with no active Table of Contents item can only exit, close the package and return to the LMS window. In these circumstances one of the following actions will ensure an available landing SCO will be available to the learner upon restarting the SCORM package:
 - LMS exit package rollup processing does not change at least one SCO to active
 - LMS entry sequencing and navigation process fails to identify an active SCO.

Error Warning: If the LMS exit and entry processing fails to identify any SCO as active for a self-directed SCORM package, the learner is placed in the dreaded “internal sequencing error” state which halts learner progress. When the halted SCORM package is a required component of a registration, the learner will be unable to complete the registration, sometimes without any recourse other than register again and repeat previously completed material.

Lesson Learned: Putting the learner on the Saba/LMS Player Window for self-directed content packages should be considered a bug. If possible, when no active SCO is identified upon launch, a error capture routine should force the learner to a diagnostic SCO which would examine objective values and return the learner to the most advanced satisfied objective area.

Army Business Rule: For self-directed content, the content must ensure a valid next SCO is available before “nav” is set to “continue” and the SCO is “terminated”.

* This information and guidance applies to content presented in the same LMS launched child window as the TOC window. The most significant impact of the SCO launched content child window is that the SCO launched child window itself must be distinctly addressed in addition to the TOC window.

SCORM 2004 Coding Requirements:

The learner may select the standard window exit control (the red X) at any time. Without trapping this event SCORM 2004 content will not send the proper communication calls to the LMS for a successful exit. The preferred JavaScript event handler to catch premature SCO exits from the Saba/LMS Player Window is 'onbeforeunload'.

When the content is presented in the Saba/LMS Player Window it is necessary to gracefully terminate the SCO, this may be done by using a global variable to indicate whether terminate has been called. The global variable should be set true during the standard exit processing contained in the content.

The [Army SCORM 2004 BRBP document](#) contains more detailed information regarding the proper usage of global variables.

Content Popup Window Considerations:

When content is presented in a Content Popup Window an additional requirement is to close the Popup Window during the processing initiated with the global variable trap. This cleans up the learners desktop. It is also important to provide the LMS with a delay when the learner has closed the LMS presented TOC window with the browser 'X' (the windows close icon). An example of a SCO window launch page with the exit delay follows (the actual SCO content is presented from 'index.html'):

```
<html>
<head>
<title>Main</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<script language="JavaScript" type="text/JavaScript">
var thiswindow;
var count = 0;
function loadWin(){
    thiswindow = window.open("index.html", "cw",
"height=600px,width=800px,status=0,toolbars=0");
}
function unloadWin(){
    if(count>=500 || thiswindow.closed){
        return true;
    }
    else{
        thiswindow.close();
        count = count + 1;
        unloadWin();
        return false;
    }
}
</script>

</head>
<body onLoad="loadWin()" onBeforeUnload="unloadWin();"><p>DO NOT CLOSE THIS
WINDOW</p>
<p>This page establishes communication between the courseware and the
LMS.</p></body>
</html>
```

The Content Popup Window presents more circumstances which must be programmatically handled. User friendliness and correct processing requires coordinated communication signals between the Popup Window and the Saba/LMS Player Window.

- Providing a course (package) exit button with an active Table of Contents requires the Popup Window to signal the Saba/LMS Player Window that the learner has requested to close the SCO **AND** exit to the LMS. When the Saba/LMS Player Window gains focus it will close itself and return the learner to the LMS Window.
- For self-directed content (no active Table of Content items) the learner should never land on the Saba/LMS Player Window.
- For self-directed content, the content should ensure that a 'nav' continue is always set and a valid next SCO is available before a SCO is terminated.