



**1EDTECH**

Power Learner Potential

# The LTI Resource Link Course Copy Conundrum

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# A course author's story of grief

## Author

1. Creates a course
2. Inserts LTI resource links (hyperlinks and iframes)
3. Copies content
4. Links break
5. Grief



# Grief Stage 1: Disbelief





# Grief Stage 2: Anger



# Grief Stage 3: Bargaining

Who is going to fix this?



Author



LMS  
Platform

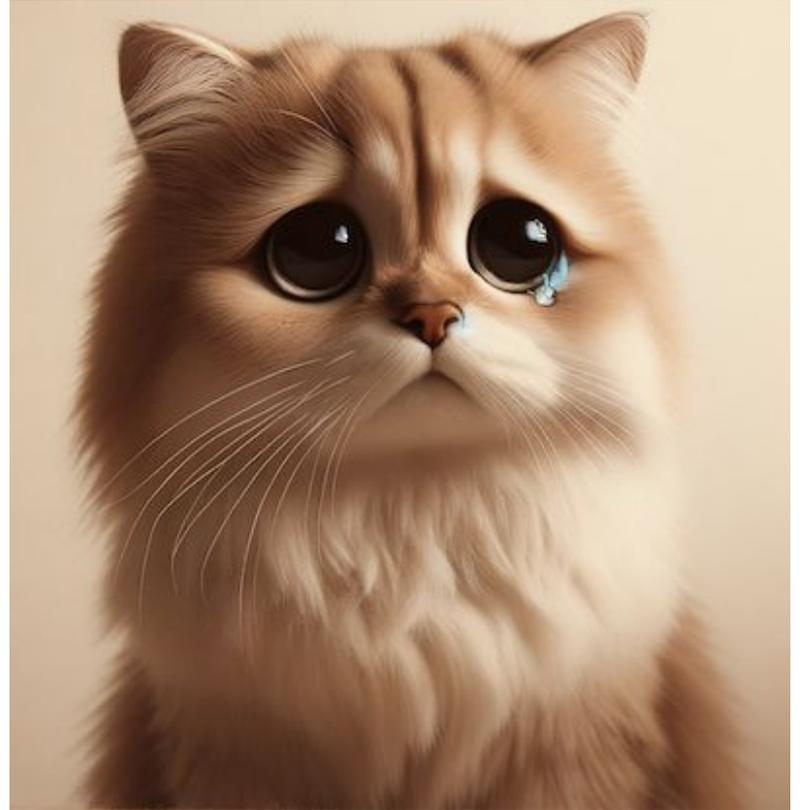


Tool  
Vendor



## Grief Stage 4: Sadness

Currently, there are no good solutions



# Grief Stage 5: Reconstruction

Maybe standards could solve this?!



# Grief Stage 6: Hope

## New LTI-A Services to the Rescue!

- Platform Notification Service
- Link and Content Services



# Outline

1. What is the problem?
2. How will we measure success?
3. What is an LTI resource link?
4. How does LTI resource link course copy currently work?
5. What are the current challenges?
6. How do the proposed LTI extensions help?



# You may have a resource link copy problem if...

Each link needs to be launched after courses are copied

and/or

You spend time updating links manually

and/or

Links in one course update the settings in another course



# What does this look like from a user perspective?

## Example problems in the wild at Penn State

- Registration of the tool is incorrect - “Free” version of content is displayed to end users
- Caliper events lack the correct context - Events look like they come from the old course
- Launches don’t work - Errors displayed to student
- Students access content before faculty - One tool made the first launch user an admin



# Course copy happens in many different ways

1. Copy for next semester
2. Repeated copies each time a course is taught
3. Copy individual resources between courses
4. Master copied to collaborators and then between collaborators
5. Children copied into parents
6. Blueprint copy
7. Push updates
8. Export to disk and import
9. Duplicate a resource within a course



# Recapping the What, Why, and How

- **What is the problem?** LTI resource links break when courses are copied.
- **Why?** LTI resource link course copy is hard
  - There are no adequate standards based solutions
  - Inordinate amounts of R&D and support are spent to solve it
- **How to Solve?** Platform Notification Service and Link & Content Service offer solutions
  - We need platform support for these specs



# Why is solving LTI Resource link Course Copy Important?

## From the customer's perspective:

Issues related to copying content is the #1 complaint received from customers and the single largest source of support cases.

## Scope of Impact:

Copying from template courses and other source courses is common practice from one session to the next. All of our LTI customers are impacted

## Business Impact:

20-30% of total support costs are related solving copy problems. 80% of last year's R&D budget was spent trying to solve this in a non-standards based way.



# Resources, Links and Placements, oh my!

D2L BRIGHTSPACE MJ Course 1 Jan 9

Content Atomic Search Quick Eval Assignments Discussions Quizzes Classlist Grades Class Progress More

Search Topics

sub module 1

Print Settings

Add dates and restrictions...

Add a description...

Upload / Create Existing Activities Bulk Edit

Atomic Assignment

External Learning Tool

Add a sub-module...

Table of Contents MJ test module sub module 1 Atomic Assignment

Atomic Assignment

This tool is configured for the demo Item bank. Please contact Atomic Jolt support.

You are viewing this activity in preview mode. Results will not be saved.

Atomic Assignment 1 of 1

Example Question

- [Choice A]
- [Choice B]
- [Choice C]
- [Choice D]

**LMS Link Placement**  
(user clicks the link)

**Link**  
(message pathway and meta-data)

**Tool Resource**  
(user interaction with tool content)



# How will we measure success?

The following results will measure the success of the standards based solution:

1. LTI standard extensions are finalized and made publicly available
  - Finalized public standards are needed for widespread adoption across tool and platforms outside the 1Edtech working group, by end of calendar year 2024.
2. All major platforms support the extensions
  - Support from major platforms incentivizes tools to support the standard increasing adoption rates, by end of calendar year 2025.
3. Customer satisfaction with the tool experience increases
  - Measured through customer surveys, reduced support cases, and increased adoption.
4. Support cases related to course copy problems drop to near zero
  - Measured by support case count after support for this standard.



# What is an LTI resource link?

1. A link to an external LTI tool resource/activity/assignment.
2. The platform loads the resource in an iframe or new tab when the user follows an LTI resource link or accesses a view that references it.
3. A resource link launch URL or custom parameters contain an **ID** that maps to a resource. For example: **[https://tool.org/lti\\_launch/5](https://tool.org/lti_launch/5)**.
4. Platforms assign globally unique ids to resource links.
5. Multiple LTI resource links can point to the same resource



# How does LTI resource link course copy currently work?

1. A link to a resource is created in a course/context. For example:
  - a. Launch URL: **[https://tool.org/lti\\_launch/5](https://tool.org/lti_launch/5)**
  - b. context\_id: 22
  - c. resource\_link\_id: 235
2. Platform copies the LTI resource link to a new context. For example:
  - a. Launch URL: **[https://tool.org/lti\\_launch/5](https://tool.org/lti_launch/5)**
  - b. context\_id: 33
  - c. resource\_link\_id: 451
3. Platform launches the LTI resource in the new context (that the tool has never seen before).
4. Tool has to decide what to do.



## This works fine when:

1. There is exactly one version of a resource.
2. If you update the resource, you are ok updating it in all contexts that it is referenced.
3. There is no context or link specific data.



# Independence - Support a resource link being modified in one context without modifying it in other contexts

Sometimes LTI resources links have context (course) and resource link specific data. For example:

- Poll
  - Course 1 - Students can see responses immediately
  - Course 2 - Students can't see responses until the due date passes
- Quiz
  - Course 1 - Contains 5 items
  - Course 2 - Contains 4 items (removed item 2)
  - Course 3 - Contains 5 items (replaced item 3)

Users expect LTI resource links to function the same in the target context.



# What are the current challenges?

P1: **Independence** - Support a resource link being modified in one context without modifying it in other contexts.

P2: **Ambiguity** - Ambiguity about which version of a resource link to copy.

P3: **Snapshot** - Copy resource links at the same time a course is copied.

P4: **Performance** - Avoid delays when resource links are launched.

P5: **Cruft** - Avoid copying data that doesn't need to be copied.

P6: **Update** - Support pushing updates from parent/master courses.

[Details](#)



# How do the proposed solutions help?

## **Platform Notification Service (ContextCopied and ResourceLinkCopied events)**

- A way for the platform to notify a tool that a course or individual resource links were copied.

**Link and Content Service** - A way for a tool to:

1. List its current resource links in a given context.
2. Update the launch URL and custom parameters for a resource link.



# Proposed solutions to resource link copy issues

[Details](#)

	Platform Notification Service (ContextCopied Event)	Platform Notification Service (ResourceLinkCopied Event)	Link Content Service (List Resource Links API)	Link Content Service (Update Resource Links API)
P1: Independence	✓	✓	✓	✓
P2: Ambiguity				✓
P3: Snapshot	✓	✓		
P4: Performance	✓	✓	✓	
P5: Cruft			✓	✓
P6: Update	✓	✓	✓	



# Summary

1. Root cause problem - limited communication channel available through LTI standard
  - a. User browser session
2. New standards were created to fill this gap
  - a. Platform Notification Service
  - b. Link and Content Service
3. These standards are quickly moving through the standards development process



# Additional details

- [Resource link independence](#)
- [The current situation](#)
- [Details about the problems](#)
- [Details about LTI-A solutions](#)



# TL;DR

- When courses are copied, LTI resource links break
- LTI resource link course copy is hard
- There are no adequate standards based solutions
- Inordinate amounts of R&D and support are spent to solve it
- Platform Notification and Content & Link LTI Services offer solutions
- We need platform support for these specs



# More about resource link independence



# What does context specific LTI resource link data allow?

1. Modify a resource link content or configuration after you link to it.
2. Multiple versions of a resource content or configuration.
3. Update resource content or configuration in a context without modifying it everywhere.
4. Make atomic updates to multiple resources in a course instead of modifying them one at a time.



# What data is associated with a resource link?

1. Link data (owned by the platform) including:
  - a. context\_id
  - b. resource\_link\_id
  - c. context\_id\_history (optional)
  - d. resource\_link\_id\_history (optional)
  - e. Custom parameters (optional)
  - f. Context (HTML iframe, module item)
2. Platform assignment settings (owned by the platform). Examples:
  - a. Due date
  - b. Published state
3. Resource content (owned by the tool). Examples:
  - a. Video
  - b. Assessment questions
4. Tool resource settings (owned by the tool). Examples
  - a. Player settings (e.g. display captions, allow full screen)



# More about the current situation



# How does a tool know that a resource link was copied?

Currently:

1. It is launched with a `context_id` or with a `resource_link_id` that it has never seen before.
2. Some platforms provide custom hooks to notify the tool.

Proposed Platform Notification LTI extension notifications:

1. `ContextCopied` - A course was copied.
2. `ResourceLinkCopied` - A resource link was copied.



# What does a tool need to do when a resource is launched in a context that it has never seen before?

1. P2: **Ambiguity** - Launch the resource in the new (target) context in the same way it would have been launched in the (source) context when the link was copied.
2. P4: **Performance** - Launch quickly.
3. P1: **Independence** - Copy context specific data for the new context.



# Details about the problems



## P2: **Ambiguity** - How do you know which version of a resource link to copy?

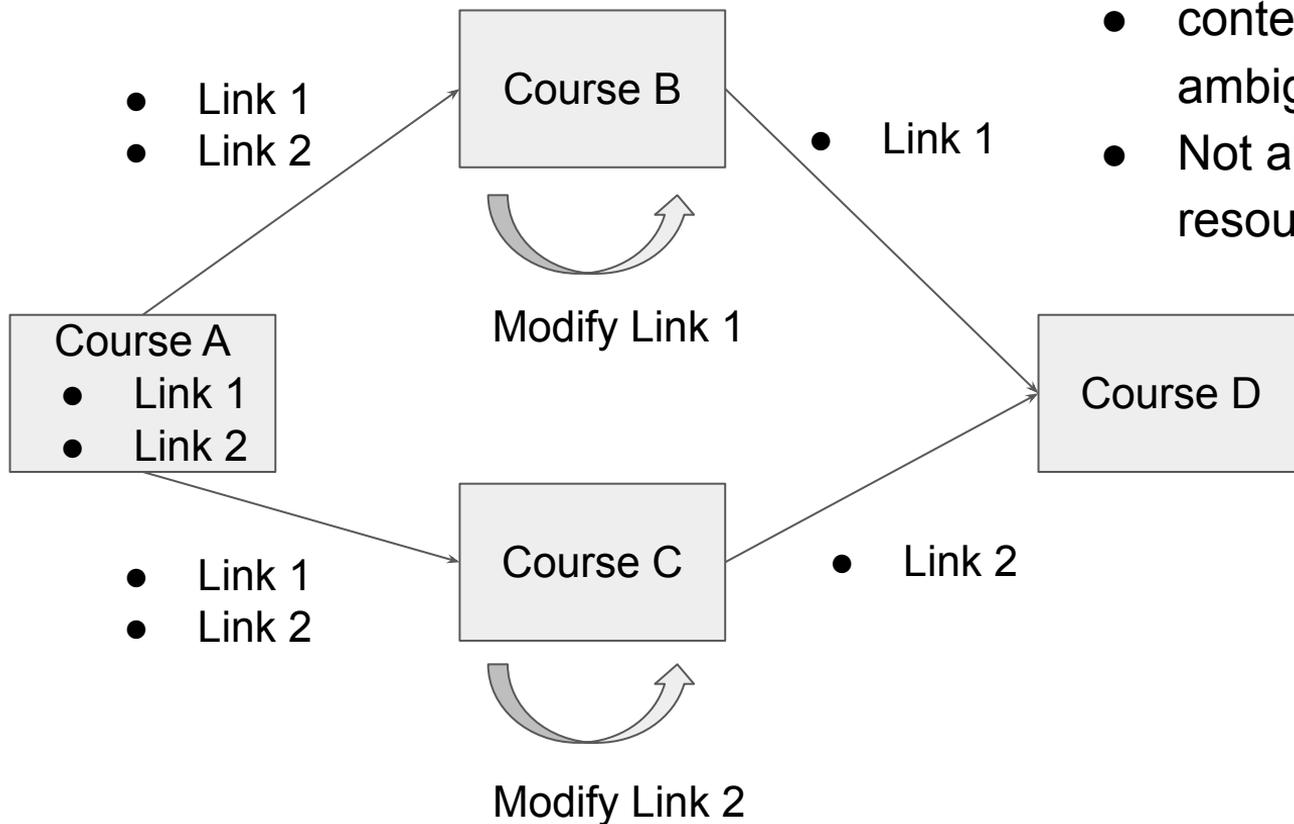
1. Find instances of the launch URL in contexts the tool has seen it before.
2. Prioritize the context that was copied into the new context.

<b>Approach</b>	<b>Problems</b>
resource_link_id_history	Some platforms don't support this optional parameter. This parameter is not available when links are imported from disk.
context_id_history	When the target course has resource links copied from multiple source contexts, or partial copies, the most recent context may not be the correct source context. This parameter is not available when links are imported from disk.
Resource link timestamp	The timestamp when a resource link was updated does not necessarily correspond to when it is copied.

3. If all else fails, ask the user. Users don't like this because of confusion and efficiency.



# Ambiguity example



Which course should the tool copy each link from?

- `context_id_history` is ambiguous
- Not all platforms support `resource_link_id_history`



# What happens when a resource link is duplicated in the same course?

Some platforms allow you to duplicate resource links inside a context (e.g. duplicate a page or module containing an LTI launch).

The tool sees the launch url in the same context it has seen before but with a different resource\_link\_id.

If the resource link is duplicated multiple times, it won't be clear which resource link to copy from.



# What problems are caused by waiting to copy a resource link until it is launched?

1. P3: **Snapshot** - If a resource link is modified in a source context after the resource link is copied but before it is launched, then the version copied will not be the version that existed as the time that the course was copied.
2. P4: **Performance** - If copying resource links takes significant time, it will delay the resource launch and degrade the user experience.



## P5: **Cruft** - Why not copy all resource links for a target context when the first one is detected?

In order to address the performance issue, when the first copied resource link in a new context is detected, you could copy all resources links from the source context in order to avoid delays in subsequent launches, but there is no guarantee that all of the resource links that the tool knows about in the source context should be copied:

1. Course authors could have deleted the resource links.
2. A partial copy could have happened.



## P6: **Update** - How does a tool know when to update a resource link?

Many organizations update content in a master course and then push/copy the updates to child courses.

If the resource link was previously copied when it was launched in the target course, there is no event to notify it to copy the update.

The only current approaches are:

1. Platform specific hooks.
2. In-tool mechanisms to manually push updates to child courses.



# LTI-A Solutions



# Reminder: current challenges

P1: **Independence** - Support a resource link being modified in one context without modifying it in other contexts.

P2: **Ambiguity** - Ambiguity about which version of a resource link to copy.

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## P2: Extension solutions to the **ambiguity** issue

Any time the configuration or content of a resource link is changed, the tool calls the **link update service** to update the launch URL or custom parameters for the resource link, effectively versioning it.

When copying a resource link, the tool can be confident that the launch url and or customer parameters uniquely define the configuration and content.



## P3: Extension solutions to the **snapshot** issue

When a course or resource links are exported, the tool is notified and it can snapshot the version of the resource links at the time that the export occurred.

If a platform implements the Update Resource Link service, then this is not important, since the launch url and custom parameters uniquely identify the copied version of resources.



## P4: Extension solutions to the **performance** issue

When a tool is notified that a course or resource links are copied, it can copy the resource then to ensure that the copies have been performed before the resource links are launched.



## P5: Extension solutions to the **cruft** issue

When a ContextCopied event is sent, the tool can call the list resource links service to know which resource links that the source course still contains and ensure that it doesn't copy resource links that have been deleted.

Instead of doing a deep copy of a resource link's data, it can wait until the resource link is modified and then store the new version and update the launch URL or custom parameters to reference the new version.



## P6: Extension solutions to the **update** issue

When a source/parent/master course is updated and the updates are copied/pushed to the child/target courses, the platform will send the tool a ContextCopied event notifying it to look to see if resource links need to be updated.

The tool can call the List Resource Links service to find out which resource links have been updated in the source course and need to be updated in the target course.

Question: If the launch URL has been updated, how it will know how to map the old version of the resource link to the new one? (Custom parameters?)

