The Learning Resource Metadata Initiative, describing learning resources with schema.org, and more?

Phil Barker & Lorna M. Campbell
Introduction

Lorna M. Campbell

Phil Barker
Outline

1. Background to LRMI (Lorna)
2. Technical overview (Phil)
3. Example implementations (Lorna, then Phil)
4. What next? (Phil, then everyone)
Background
Learning Resource Metadata Initiative
HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC)

**SITUATION:**
THERE ARE 14 COMPETING STANDARDS.

**14?! RIDICULOUS! WE NEED TO DEVELOP ONE UNIVERSAL STANDARD THAT COVERS EVERYONE’S USE CASES. YEAH!**

**SOON:**

**SITUATION:**
THERE ARE 15 COMPETING STANDARDS.

“Standards” from XKCD by Randall Munroe http://xkcd.com/927/
Spurred by schema.org

“Schema.org is a joint initiative by Google, Yahoo, Microsoft Bing, Yandex and W3C that aims to help search engines interpret information on web pages to improve the display of search results, making it easier for people to find the information they are looking for on the web.”
What is LRMI? (take 1)

- Learning Resource Metadata Initiative.
- Three phase project funded by Bill and Melinda Gates Foundation.
- Co-led by Creative Commons and the Association of Educational Publishers (AEP) (part of Association of American Publishers).
- Working group included educators, publishers, metadata specialists.
- Now governed by the Dublin Core Metadata Initiative.
But what does LRMI do?

LRMI aims to make it easier for teachers and learners to find educational materials through major search engines and specialized resource discovery services.
How does it do that then?

LRMI has extended the schema.org ontology in order to allow the description of educationally important properties of resources to be marked-up in web pages in a manner that is easily understood by search engines.

LRMI has added properties to schema.org to describe items of type CreativeWork.
So what is LRMI? (take 2)

- LRMI is a metadata specification based on schema.org that can be used to describe learning resources.
- LRMI is a community of people interested in using that specification.
Technical Overview
Recap: what does LRMI do?

LRMI aims to make it easier for teachers and learners to find educational materials through major search engines and specialized resource discovery services.
Motivation

Meet Pam, let’s say she wants to teach a lesson about the *Declaration of Arbroath (1320)*

Photo by Vgrigas
Motivation

She might search Google:

Photo by Vgrigas
Motivation

There are many educational parameters Pam might use to narrow the search results to those which are more appropriate, but Google doesn’t support them. She is forced into a fragmented world of specialist search services based on (often siloed) metadata.
History teaching resources

23,201 Free history resources: history lesson plans, history worksheets, history revision, history teaching ideas and much more.

Last updated: 16 June 2014

Delve into the past and take your students on a time-travelling trip without leaving their seats with our collection of free history teaching resources devised by teachers, for teachers.

Our most recent collections include a look back to the Crusades as well as Black History Month resources. You can also search for highly-rated resources, history worksheets and lesson plans and material for history revision to find out how to bring new life to your lessons.

History Week
Join us between 16 and 20 June as we have a look at the changes to the national curriculum for history

Teaching the First World War
Commemorate the First World War centenary with these teaching resources and activities
Why can’t Google do this?
Author J. Cetis?

[PDF] Open educational resources–Opportunities and challenges for higher education
J CETIS - 2008 - muele.mak.ac.ug
Page 1. 1 Open Educational Resources – Opportunities and Challenges for Higher Education
Li Yuan; Sheila Mac eill; Wilbert Kraan JISC CETIS 1. Introduction Higher education institutions
around the world have been using the Internet and other digital ...
Cited by 69  Related articles  All 14 versions  Cite  Save  More

[PDF] Learning Material Application Profile Scoping Study–final report
P Barker, J Cetis - JISC CETIS, 2008 - publications.cetis.ac.uk
1. Summary This report details the findings of a scoping study carried out for the JISC to
investigate a potential metadata application profile for learning materials. The objective of
the study was to synthesize and analyse the advice that is currently available to managers ...
Cited by 3  Related articles  All 6 versions  Cite  Save  More

The JISC Design for Learning Experience: Perspectives on Creating, Developing and 8
for Learning.
S MacNeill, L Corley, J CETIS - ICALT, 2008 - doi.ieeecomputersociety.org
Abstract This paper will a provide a summary of the current effort in the UK, through the Joint
Information Systems Committee (JISC) funded Design for Learning Programme, to
synthesize the approaches of e-Learning developers providing systems, services and ...
Cited by 2  Related articles  All 4 versions  Cite  Save  More

Screen shot from Google Scholar. NB, J CETIS = JISC CETIS, the author’s affiliation
Why can’t Google do this?

People search for things not strings

http://googleblog.blogspot.co.uk/2012/05/introducing-knowledge-graph-things-not.html

Google (and other search engines) recognise that they need help in identifying what thing a string they index refers to.
Learning Resource Metadata Initiative: using schema.org to describe open educational resources.

By Phil Barker, Cetis, School of Mathematical Computer Sciences, Heriot-Watt University
Lorna M Campbell, Cetis, Institute for Educational Cybernetics, University of Bolton. April 2014

Abstract
This paper discusses the Learning Resource Metadata Initiative (LRMI), an international project that aims to facilitate the discovery of educational resources through the use of embedded metadata that can be used by search engines (e.g. Google, Yahoo, Bing, Yandex) to refine the search services they
What the computer sees

<h1>Learning Resource Metadata Initiative: using schema.org to describe open educational resources</h1>
<p>By Phil Barker, Cetis, School of Mathematical and Computer Sciences, Heriot-Watt University</p>
<p>Lorna M Campbell, Cetis, Institute for Educational Cybernetics, University of Bolton. April 2014</p>
What the computer needs

Scholarly Work

Learning Resource Metadata Initiative: using schema.org to describe open educational resources

Person

name

Phil Barker

affiliation

Cetis, School of Mathematical and Computer Sciences, Heriot-Watt University

Person

name

Lorna M Campbell

affiliation

Cetis, Institute for Educational Cybernetics, University of Bolton
What schema.org provides

An agreed hierarchy of resource types.

An agreed vocabulary for naming the characteristics of resources and the relationships between them.

Which can be added to HTML (as microdata, RDFa or JSON-LD) to help computers understand what the strings or text mean.
What schema.org provides

<div itemscope itemtype="http://schema.org/ScholarlyArticle">
<h1 itemprop="name">Learning Resource Metadata Initiative: using schema.org to describe open educational resources</h1>
<p itemprop="author" itemscope itemtype="http://schema.org/Person">
<span itemprop="name">Phil Barker</span>,
<span itemprop="affiliation">Cetis, School of Mathematical and Computer Sciences, Heriot-Watt University</span></p>
<p itemprop="author" itemscope itemtype="http://schema.org/Person">
<span itemprop="name">Lorna M Campbell</span>,
<span itemprop="affiliation">Cetis, Institute for Educational Cybernetics, University of Bolton</span></p>
</div>

**NB:** The syntax shown here is microdata, schema.org also supports RDFa Lite 1.1 and JSON-LD
LRMI

schema.org didn’t have a way of naming the educational parameters that could have helped Pam narrow her search, so LRMI added them:

- Educational alignment (more later)
- Educational use
- Interactivity type
- Is based on url
- Learning resource type
- Time required
- Typical age range
- Use rights URL
- Educational role (of target audience)

http://dublincore.org/dcx/lrmi-terms/

*except use rights URL
Educational alignment

An alignment to an established educational framework, e.g.

- Shared curriculum or syllabus
- Shared framework of competency requirements
- Set of educational levels
- Modules making up a course

Allows encoding of statements like

“this resource teaches X”
“this resource assess X”
“this resource requires knowledge of Y”
Educational alignment

An alignment to an established educational framework
Educational alignment

LRMI elements identify something in an educational framework, they do not describe it.
An example alignment

Angle between 2 lines

Screenshot from https://kritikos.liv.ac.uk/details/?uri=http://www.slideshare.net/SimonBorgert/angle-between-2-lines
An example alignment

Angle between 2 lines

Screenshot from https://kritikos.liv.ac.uk/details/?uri=http://www.slideshare.net/SimonBorgert/angle-between-2-lines
An example alignment

![Diagram showing an alignment object with properties:]
- **Alignment type**: "Teaches"
- **Framework name**: "University of Sheffield Modules"
- **Target name**: "MAS153 Mathematics (Materials)"
- **Target URL**: `http://maths.dept.shef.ac.uk/maths/module_info_1348.html`

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CreativeWork

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A Year 1 BSc Materials Science and Engineering (Biomaterials) student at University of Sheffield recommended this for the Mathematics (Materials) module 16 Nov 2014.  

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### Other example alignments

<table>
<thead>
<tr>
<th>alignment type</th>
<th>framework name</th>
<th>target name</th>
<th>target URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>educational level</td>
<td>Scottish Credit and Qualifications Framework</td>
<td>Level 10</td>
<td>?</td>
</tr>
<tr>
<td>reading level</td>
<td>Lexile</td>
<td>880L</td>
<td><a href="https://map.lexile.com/880">https://map.lexile.com/880</a></td>
</tr>
<tr>
<td>assesses</td>
<td>UK Standard for Professional Engineering Competence</td>
<td>E1 Comply with relevant codes of conduct</td>
<td>?</td>
</tr>
<tr>
<td>educational subject</td>
<td>Joint Academic Coding Scheme</td>
<td>N323 Actuarial science</td>
<td>?</td>
</tr>
</tbody>
</table>
LRMI

schema.org didn’t have a way of naming the educational parameters that could have helped Pam narrow her search, so LRMI added them:

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http://dublincore.org/dcx/lrmi-terms/

DONE

Added to schema.org

April 2013*

*except use rights URL
So...

- LRMI have enhanced schema.org so that it better supports description of learning resources.
- What is really needed for its success is for
  1) more resource dissemination channels to use it &
  a) more search services.
Example Implementations
Funded Implementation Projects

During LRMI Phase 2 the Hewlett & Gates Foundations funded 10 OER platforms to implement LRMI

- Curriki
- Gooru
- OER Commons
- OpenStax CNX
- Open Tapestry
- Jorum
- MERLOT
- P2PU
- PhET Interactive Simulations
- Untrikiwiki
Implementation Case Studies

- Case studies of all 10 implementations available on Open World blog: [http://lornamcampbell.wordpress.com/tag/lrmi-implementation/](http://lornamcampbell.wordpress.com/tag/lrmi-implementation/)

- Synthesis to follow shortly.
Implementation Synthesis Findings

- Few platforms used LRMI as their native metadata schema.
- Most used internal custom metadata schema and transformed to LRMI.
- Most rely on third parties for metadata creation - metadata is harvested or created by users.
- Volume and quality of metadata varies widely.
- Few have metadata curation workflows.
- Not always easy to embed LRMI microdata in resource pages, but...
- Few reported problems with implementing LRMI.
Other Implementations

- BBC Knowledge & Learning Beta - [http://www.bbc.co.uk/education](http://www.bbc.co.uk/education)
- Open University OpenLearn - [http://www.open.edu/openlearn/](http://www.open.edu/openlearn/)
- Solvonauts Open Search Engine - [http://solvonauts.org/](http://solvonauts.org/)
- CTE Online - [https://www.cteonline.org/](https://www.cteonline.org/)
- Awesome Stories - [https://www.awesomestories.com/](https://www.awesomestories.com/)
- Various publishers, including Pearson.
- Educational metadata in draft EPUB3 EDUPUB Profile is based on LRMI properties.
Other Implementations

- The learning registry [http://learningregistry.org/](http://learningregistry.org/)

- “a new approach to capturing, connecting and sharing data about learning resources available online.”

- Significant for its extensive use of LRMI in the form of JSON-LD records as its base metadata schema.
You won’t see implementation by big search engines until there is web-scale implementation by resource providers.

But, what is motivation for resource providers to expose metadata before use by search engines?

Google custom search engine potentially offers a “boot strap”.

Implementation by search engines
Google custom search engine

Google custom search allows you build a Google-powered search limited to a list of domains or schema.org types, and filtered according to schema.org properties.

For example:

- limit searches to pages that have an Alignment Object (pages that describe learning resources)
- filter by alignment with what you want to be learnt
Google custom search engine

Sites to search

Search the entire web but emphasise included sites

Label sites by search

Add  Delete  Filter  Label

You have not included any sites.

Advanced

Restrict Pages using Schema.org Types

Restrict pages from the above site list to only those that contain Schema.org types from the list below.

You can add up to ten (10) schema.org types to your Search Engine. Note that when you add a node, all its children are included automatically, so you do not need to add them again. For example, if you add CreativeWork, you do not need to add Book, ImageObject, VideoObject etc. separately.

AlignmentObject

Update

https://www.google.co.uk/cse/
Google custom search engine
Google custom search

BBC - GCSE History - Declaration of Arbroath
www.bbc.co.uk/education/clips/z5y7pq4
What it meant for Robert the Bruce to be excommunicated and the Declaration of Arbroath.

BBC - GCSE History - William Wallace
www.bbc.co.uk/education/clips/z5y7pq4
Newport's medieval ship. Play Wallace's death. Wallace's death. Play. Declaration of Arbroath. All GCSE The Middle Ages (12th to 15th century) videos ...

BBC - GCSE History - The Battle of Stirling Bridge
www.bbc.co.uk/education/clips/zgy7pq4
Declaration of Arbroath. Play. The early life of Owain Glyndŵr. Play Newport's medieval ship. Newport's medieval ship. All GCSE The Middle Ages (12th ...


Photo by Vgrigas
Google custom search

Google themselves have also had a go...

http://edu.schema-labs.appspot.com/
What next for LRMI?
Remember

- LRMI is a metadata specification based on schema.org that can be used to describe learning resources.
- LRMI is a community of people interested in using that specification.
A new home for LRMI

“Effective October 23, 2014, leadership and governance of the Learning Resource Metadata Initiative (LRMI), an education metadata project developed to improve discoverability and delivery of learning resources, have transferred from the Association of Educational Publishers and Creative Commons to the Dublin Core Metadata Initiative (DCMI).”

http://www.lrmi.net/lrmi-transfers-stewardship
LRMI in DCMI

- Stability of current specification through DCMI’s governance
- RDF expression of current specification
- Coordinate LRMI group with DCMI-Education
- Future developments in accordance with DCMI governance
Future developments?

• Current properties are stable. However,
• should clarify use of LRMI as web page markup per schema.org? as record format?
• more help on value spaces for properties?
• could extend domain to include events?
• could extend to cover courses?
• react to relevant changes in schema.org?
• other new properties & clarifications?
Further Information

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- Lorna M campbell, Cetis - lorna.m.campbell@icloud.com
- Stuart Sutton, DCMI - sasutton@dublincore.net
- LRMI Googlegroup - lrmi@googlegroups.com
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• Photo of Pam Robertson, teacher, by Vgrigas (Own work) [CC-BY-SA-3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons
Pam really is a teacher but we have no idea whether she would want to teach anything related to the declaration of Arbroath
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