

Figure 1 – Concept map for Data elements (ISO/IEC 19788, Annex C, p. 50)

DCMI does not impose ‘rules’ but has precedents from community practice such as the ‘dumb-down’ rule. This rule supports backward compatibility and interoperability and is used to ensure a new term in a values vocabulary, for instance, does not break interoperability. A new term must be a refinement of an established term, or completely distinct from all others. For the DCMI community, adding the term *moving image* to the list of values including *image* for *type* of resources was contentious because it threatened to break this rule.

5.5. MLR Application Profiles

As an MLR application profile can include data elements from other sources, users may opt for the adoption of original DCMTs establishing a mixture of them and MLR data elements, or possibly just DCMTs. From the DC Metadata perspective, this is also acceptable. Just how interoperable or conformant such an application profile will be to the DC model is perhaps best determined by reference to the DC Singapore Framework.

5.6. MLR Data Element Identifiers

Identifiers have evolved considerably since the early days of DC Metadata. ISO/IEC obliged the editors of the MLR to include identifiers in the standard, with verbal definitions. These are clumsy, by comparison with registry entries that would be allowed now. Nevertheless, the editors worked to provide unique identifiers that could be published online and it is possible to resolve them by reference to a namespace following a complicated set of rules for the definition of the terms (see ISO/IEC 19788-1, footnote to 6.2.1.1, Rule 004).

5.7. MLR Records

A MLR Record is a specified set of data elements for describing a specific learning resource and resources directly related to that learning resource. (19788-1, Clause 10.1)

This replicates the DC 1:1 rule and Abstract Model in that a description is to be of a resource directly, with the domain specified, but there can be a record with several of these included. An

MLR Record is the equivalent of a DC Description Set. In practice, descriptions might be of resources that are related and can be 'chained' (as the author thinks of it). An example is where the personal details of an illustrator of a learning resource are being described. Here the links run from the resource to the person and then to the description of the person. Each link in the chain has a subject (legitimate according to the domain of the term) and a value (within the term's range) that becomes the subject (again legitimately within the term's domain) for the next value.

5.8. MLR Part 5 – Educational Data Elements

The ISO/IEC JTC1 community worked with others to develop a concept map of their needs. The resulting diagram (Figure 2), illustrates the data element specifications for 19788-5, the part where educational, or pedagogical data elements have been added to 19788.

As can be seen in Figure 2, the domain for some of the data elements introduced in Part 5 varies according to the data element. There is a domain of contribution, and this is described by a number of properties, as is the potential audience for the learning resource. This is not the approach that DC Metadata usually takes, where a resource is described by a property or a refinement of that property. In the case of DC Metadata, a lot of the elegance of the metadata has come from the technique of using refinements.

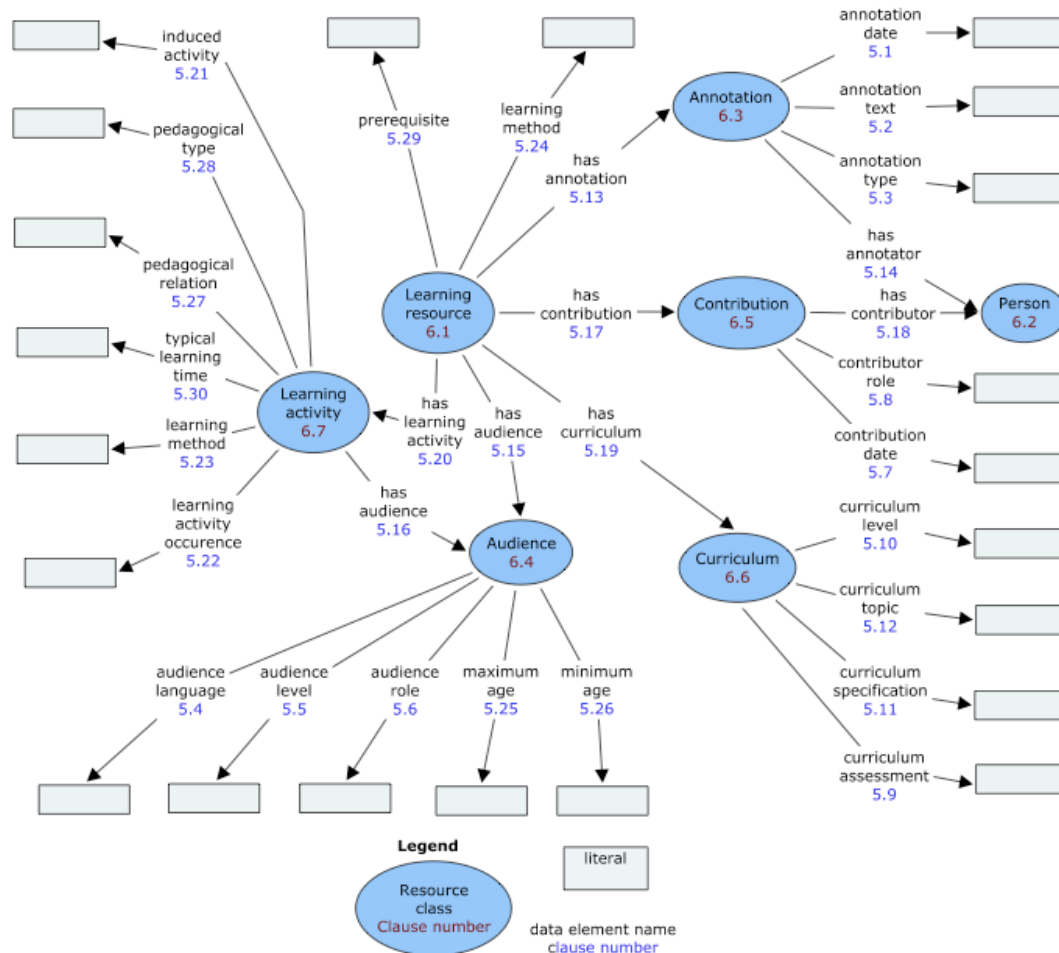


Figure 2: Diagram of data element specifications for ISO/IEC 19788-5 (Appendix C of Part 5)

A data element such as annotationDate could describe an annotation to the original resource and be a refinement of date, following the DC Abstract Model. The advantage of this approach,

of course, is that the DC ‘dumb-down’ rule would apply. The advantage of working the MLR way is that it is RDF compliant and there are tools, such as SPARQL, that would search and find the metadata.

Personally, the author favours the DC approach for elegance and simplicity. There are fewer things to think about! The structure is more obvious, in some ways. An annotation can be a significant resource, in itself. In fact, it can be described in the same way as the other resource, and simply related to it, using the *relation* data element from Part 2.

It is suspected that the way Part 5 has been conceived has come from LOM thinking, where hierarchical sets of metadata were common. The MLR aims to flatten everything. So an interesting question might be, “What about a crosswalk from the MLR to DC Metadata, or the reverse?” Not all the properties considered by the MLR have equivalent DC terms, of course. Another might be, “What if an ‘annotation’ is a learning resource? Does it have two sets of descriptive metadata? or a combination of both? It is easy to see how one goes from a learning resource to an annotation but how messy will the map become when the annotation, as a learning resource, has an annotation?”

5.9. MLR Interoperability

MLR Part 3 offers an informative crosswalk from the LOM to the MLR (19788-3, Annex C1). It was a long and painful process shifting the emphasis from the LOM to the MLR, changing from databases and records to triple stores and RDF. Now that the MLR is mature, and the change has been supported, there is still cleaning up to do to some of the definitions to ensure the switch is complete. There are also areas for which more data elements are expected. There is a revision cycle for such standards and it is also possible there will be a second version once there is more experience with the use of the MLR.

A DC (education) to MLR crosswalk is shown in ISO/IEC 19788-3 Informative Annex C2:

TABLE 1: DCMI to ISO/IEC 19788 MLR Crosswalk of ‘educational’ data elements

Dublin Core	MLR	
Name	ISO_IEC Identifier	Name
audience	19788-5:2012::DES0400	audience language
	19788-5:2012::DES2500	maximum age
	19788-5:2012::DES2600	minimum age
coverage (spatial/temporal)	19788-2:2011::DES1400	coverage
educationLevel	19788-5:2012::DES0500	audience level
instructionalMethod	19788-5:2012::DES2400	learning method
mediator	19788-5:2012::DES0600	audience role
subject	19788-5:2012::DES1200	curriculum topic

There are also crosswalks provided in the annexes of 19788-5. For the future, as a matter of policy, SC36 has decided to provide information about how to transform LOM metadata into MLR-conformant metadata rather than trying to maintain the two in parallel.

6. The Diagrams from the MLR

The MLR contains a number of diagrams designed to help with its understanding and use. Many of these may also be useful to DC users.

In developing the MLR in its current form, it has become clear that, for many, changing from databases and records to triple stores and RDF involves a difficult ‘leap of faith’. This problem is familiar in the DC world where some say the DC Abstract Model helps and others find it totally

confusing: some people find diagrams difficult, and prefer words, while others work better with diagrams.

In particular, as users are not expected to have to understand the definition of data elements in the MLR, or terms in the DC Abstract Model, the problem is usually only for developers of new data elements. The use of diagrams has clarified, if not made understandable, how the data elements should be developed. Where there is confusion about the domain, for example, there is a need to work more until it is clear that the domain of a data element is as it should be. This work is often best done by working dynamically with RDF diagrams. Particularly the process of working out what is a unique 'class' and what is a refinement or in conflict with another 'class' is often made clear by diagrams.

As an example, the concept map for 19788-5 might have led to a different set of data elements. If the resource class was not different for, say, an annotation, there might be two resources for description that would both be thought of as 'learning resources'. Then the description of the annotation might use many of the same terms as are used for the original learning resource with the difference that it would be identified as in *relation* to the original as a resource of *type* annotation. These latter terms could then be standard DC Metadata Terms, or MLR adaptations of DC terms (19788-2). Characteristics such as the date of the annotation could appear, sensibly, in two places; once as the date on which the resource was annotated (with subject of learning resource) and secondly as the date of creation of the resource that is the annotation (with subject annotation). The first, the date of annotation as a property of the learning resource, would be a refinement of the term date if this were being done according to the DC Abstract Model and could be, according to the MLR Framework.

The way that 19788-5 defines the metadata now, if a learning resource is an annotation of another learning resource, it will not be described using the same data elements as the original which might lead to confusion.

7. Conclusion

It is expected the ISO/IEC 19788 standard for Metadata for Learning Resources will be used widely within education around the world. As well as formal adoptions in some countries, significant participation in its development by experts from China supports this expectation. As education becomes a global enterprise, this is important for teaching and learning users.

Perhaps it is the case that what has previously been known as 'qualified Dublin Core' has been adopted by ISO/IEC? If the Framework of 19788-1 establishes the equivalent of the DC Abstract Model, and then adopts the DC terms, not just with modifications as in Part 2 but exactly and completely in another part, or in an Application Profile, arguably the result will be DC Metadata.

Rather than be concerned about what is or isn't DC Metadata, this paper shows that outside of the DCMI, people who have worked in the DC community or with DC Metadata are busily developing new versions of it and standards communities are building fruitfully on the earlier DCMI work. This should be considered as yet another accomplishment of the DC community.

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Abbreviations and Links

DCMES: Dublin Core Metadata Element Set (ISO/IEC 15836)

http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=52142

DCAM DCMI Abstract Model ???

DCMT DCMI Metadata Terms <http://dublincore.org/documents/2012/06/14/dcmi-terms/>
DC Metadata Registry at <http://purl.org/dcregistry/>
OAI-PMH Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) <http://www.openarchives.org/pmh/>
LOM - IEEE 1484.12.1 – 2002 Standard for Learning Object Metadata
<http://standards.ieee.org/findstds/standard/1484.12.1-2002.html>
MLR Part 1, ISO/IEC 19788-1, freely available at
http://standards.iso.org/ittf/PubliclyAvailableStandards/c050772_ISO_IEC_19788-1_2011.zip
MLR all published parts <http://www.iso.org/iso/home/search.htm?qt=19788&sort=rel&type=simple&published=on>
NISO, National Information Standards Organization <http://www.niso.org/>
Schema.org <http://schema.org>
SKOS, Simple Knowledge Organization System <http://www.w3.org/2004/02/skos/>
SPARQL, SPARQL Query Language <http://www.w3.org/TR/rdf-sparql-query/>
RDF, Resource Description Framework <http://www.w3.org/RDF/>
Semantic Web <http://www.w3.org/standards/semanticweb/>
W3C <http://www.w3.org/>

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