Representation Patterns for Cultural Heritage Resources

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The Problem

Currently, librarians, archivists, and museum professionals can choose from a large universe of representation standards (see Figure 1). Each of these standards exhibits various strengths and weaknesses based on the problems they are engineered to address. Unfortunately, standards developers do not always explicitly articulate the problems or the contexts that shaped a particular solution. Although Greenberg (2005) provides a way to classify standards according to their domain, objectives, and architecture, there is no mechanism to identify and organize the features found within a standard.

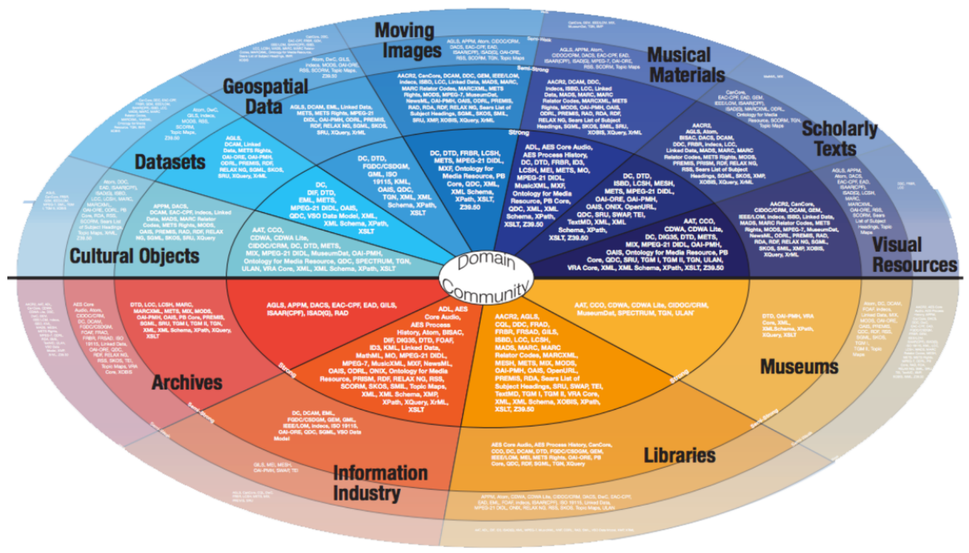

Figure 1: Seeing Standards: A Visualization of the Metadata Universe (Riley & Becker, 2010)

Solution

Design patterns – optimal solutions to common problems – are useful tools used by developers for software engineering, interface design (Figure 4), ontology development, and Linked Open Data modeling (Figure 3) (Gamma, et al., 1995; Blomqvist, Gangemi, & Presutti, 2009; Dodds & Davis, 2011; Gangemi, 2005; van Harmelen, ten Teije, & Wache, 2011). Although the library, archive, and museum (LAM) domain frequently uses concrete examples in standards documentation, these examples lack important features which make design patterns useful. In addition to providing solutions, design patterns serve an important function by identifying and articulating common problems. By doing so, design patterns create a shared technical lexicon around which designers, developers, and creators can structure their conversations (Dearden & Finlay, 2006). Because design patterns make problems, their contexts, and solutions explicit, they can serve as important educational tools for students and novices (Chatzigeorgiou, Tsantalis, & Deligiannis, 2008). Design pattern languages are also capable of expressing patterns at different scales and in ways that build relationships among patterns (Alexander, 1977).

Ongoing Research

The initial work funded through the FYAP grant exposed several difficulties in shared understandings of what design patterns are and how they can be used. This observation translated into a series of qualitative questions that are driving semi-structured interviews with individuals responsible for developing cultural heritage Linked Data services. At this time five interviews are complete. The results of these interviews will inform future development of a published pattern library.

LODLAMPATTERNS

http://lodlampatterns.org/protopattern/

Surrogate Identity

Problem

How can I distinguish between metadata about an original resource and metadata about a surrogate that stands in for that resource?

Context

Cultural heritage repositories contain surrogate representations of resources they hold in their collections (i.e., a digital image that depicts a painting). Some document-based data management patterns may conflate these entities, resulting in confusing, incoherent metadata (Hutt & Riley, 2005).

Solution

Cultural heritage data models should explicitly include surrogate resource classes that can be identified independently of the resource a surrogate instance represents. Models should specify the relationship between a resource and its surrogate(s).

Related Patterns

- One graph per resource (Dodds and Davis, 2011)

Examples

- Categories for the Description of Works of Art (CDWA) (Work/Related Textual or Visual Documentation)
- Dublin Core Abstract Model (1:1 Principle)
- Europeana Data Model (EDM)
  - Requirement 1: distinction between "provided objects" (painting, book, movie, archeology site, archival file, etc.) and their digital representations.
  - Requirement 2: distinction between objects and metadata describing the object.
- VRA Record Type (Work/Image)

References

Alexander, C., Ishikawa, S., & Silverstein, M. (1977). *A pattern language: Towns, buildings, construction.* New York: Oxford University Press.

Blomqvist, E., Gangemi, A., & Presutti, V. (2009). Experiments on pattern-based ontology design. In *Proceedings of the fifth international conference on knowledge capture* (pp. 41–48). New York, NY: ACM.

Chatzigeorgiou, A., Tsantalis, N., & Deligiannis, I. (2008). An empirical study on students' ability to comprehend design patterns. *Computers & Education*, 51(3), 1007–1016.

Churchill, E. (2012). From data divination to data-aware design. *Interactions*, 19(5), 10–13.

Danielsson, K., Naghsh, A. M., Gumm, D., & Warr, A. (2008). Distributed participatory design. In *CHI'08 Extended Abstracts on Human Factors in Computing Systems* (pp. 3953–3956). New York, NY: ACM.

Dearden, A., & Finlay, J. (2006). Pattern languages in HCI: A critical review. *Human–Computer Interaction*, 21(1), 49–102.

Dodds, L., & Davis, I. (2011). *Linked Data patterns: A pattern catalogue for modelling, publishing, and consuming Linked Data.* Retrieved from: http://patterns.dataincubator.org/

Gamma, E., Helm, R., Johnson, R., & Vlissides, J. (1995). *Design patterns: Elements of reusable object-oriented software*. Reading, Mass.: Addison-Wesley.

Gangemi, A. (2005). Ontology design patterns for Semantic Web content. In Y. Gil, E. Motta, V. Benjamins, & M. Musen (Eds.), *The Semantic Web – ISWC 2005* (Vol. 3729, pp. 262–276). Springer Berlin/Heidelberg. Retrieved from http://www.springerlink.com/content/f513071t4477h2w2

Greenberg, J. (2005). Understanding metadata and metadata schemes. *Cataloging & Classification Quarterly*, 40(3-4), 17–36.

Riley, J., & Becker, D. (2010). Seeing Standards: A visualization of the metadata universe. Indiana University Libraries. Retrieved from http://www.dlib.indiana.edu/~jenlrile/metadatamap/

van Harmelen, F., ten Teije, A., & Wache, H. (2011). Knowledge engineering rediscovered: Towards reasoning patterns for the semantic web. In D. Fensel (Ed.), *Foundations for the web of information and services: A review of 20 years of semantic web research* (pp. 57–74). New York: Springer.