Software Sustainability Challenge: ECOLM and Lute Tablature

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1 NATURE AND PURPOSE OF THE SUSTAINABLE TOOL OR RESOURCE

ECOLM (1999-2002) was a project led by Tim Crawford which developed and populated a database of lute tablature encodings with metadata, for scholarly use, queried using a web interface. Subsequent projects **ECOLM II** (2002-2006) and **ECOLM III** (2012) expanded the database and used it for some computational musicological investigations. The resulting database was hosted on a public-facing web server at Goldsmiths, University of London.[1] It is still running today, although nobody is formally responsible for maintaining it.

ECOLM is a relatively small scholarly resource with around 2,000 carefully-curated encodings. A number of other public lute tablature resources exist, of varying size, quality, and consistency (see section 2). These typically face challenges to sustainability similar to those of ECOLM (see section 3). It seems useful to consider those challenges for such resources in general, at least insofar as they address the same audience.

2 AUDIENCE AND USERS, DISCIPLINES AND SUBJECTS

We are considering here the sustainability of at least five lute tablature datasets: ECOLM itself; **lutemusic.org**[2] by Sarge Gerbode; **mss.slweiss.de**[3] curated by Peter Steur and the late Markus Lutz; a set of scans from **Lute Society publications** curated by John Robinson; and a set of transcriptions of **editions by Pierre Phalèse** curated by Jan Burgers. All of these are either Creative Commons licensed or have been offered by their maintainers as possible constituents of a future combined tablature resource.

These resources serve a spectrum of audiences. At one end, lutemusic.org aims at performers and includes edited transcriptions with relatively little scholarly metadata or editorial comment. At the other, ECOLM is aimed at computational musicologists and prioritises diplomatic facsimiles and transcriptions that preserve original scribal idiosyncracies.

In this review we are particularly interested in sustainability for musicology and other academic purposes. To this end, we asked three exemplary users of online early-music resources—a musicologist, a computational musicologist, and a lute teacher—for their views about them in order to understand scholarly expectations.

Briefly, they agreed on the importance of trust and provenance, particularly in knowing about the quality of transcription and level of editorial intervention in a resource. There was some consensus about the value of simple search with subsequent refinement, of cleanly laid-out results including inline incipits, and of API and data provision. Resources mentioned as worth learning from included DIAMM[4] (Digital Image Archive of Medieval Music), the Vihuela Database,[5] the Josquin Research Project,[6] and RISM[7] (Répertoire International des Sources Musicales) which is a near-ubiquitous entry point for musicological queries.

3 CHALLENGES FOR SUSTAINABILITY

4 FUTURE DIRECTIONS

We have identified three alternative directions for sustainable development.

4.1 "Enhanced ECOLM"

This approach would retain the relational data schema of the existing ECOLM, which is detailed and fairly effective, although it has little in common with the other systems we have considered or with wider current practice. We then provide ETL-type (extract, transform, load) data loaders for other sources of interest.

Advantages of this approach include the ability to preserve existing code and to use original ECOLM records as a reference. The existing schema provides appropriate structure and reflects some good domain-specific decisions. Relational data import is a well understood field, and we could focus on user interfaces and data conversion rather than any novelty of data representation.

Disadvantages include that the schema has little in common with any of the ad-hoc solutions other maintainers have settled on, so all import and export would be custom. The schema is perhaps already overspecified for its current use, yet does not address any problems relating to stable identifiers, versioning, or providing queryable APIs or data sources.

Although we could at least initially reuse the existing user interface, it is no longer considered a strength of the system and would need some work to update to modern expectations.

4.2 Graph-based

In this approach we would take the fundamental representation to be a graph of triples in the model of RDF, and convert all metadata

[1] http://doc.gold.ac.uk/isms/ecolm/database/
[2] https://lutemusic.org/
[3] https://mss.slweiss.de/
[4] https://www.diamm.ac.uk/
[5] https://vihuelagriffiths.com/
[6] https://josquin.stanford.edu/
[7] https://rism.info/

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to that for import and from it for query. External data such as transcriptions and multimedia resources are identified by graph-relatable identifiers such as URIs.

Advantages include the use of a widely-understood and accepted model that meets common expectations about data compatibility and API provision. For schema we can draw ontologies from a number of existing systems. The structure is reasonably amenable to versioning and to use of "idempotent" import flows with automated testing, offering the option of ongoing import of changes in upstream sources. In principle existing tools may be used for review, query, inferencing, and format conversion.

The approach has difficulties as well. It discards the existing user interface work and requires even the existing ECOLM data to be converted. Although graph representations have wide application, they are not generally used for manual data management and therefore have as little in common with the ad-hoc schemas of enthusiast lute resources as with that of ECOLM. Significant work would be required to maintain stable identifier mappings from external sources. With a more flexible structure than ECOLM's relational database, care and good automated testing would be needed to avoid "silently missing data" problems on query. Finally a separate solution would be needed to the problem of identifying and retrieving non-graph data such as media resources.

Although in this approach we could no longer use the existing ECOLM user interface, that may be slightly mitigated by the ability to adapt other graph-driven UIs to the model.

4.3 "RISM-aligned"

Fundamental metadata representation is MARC, and we use Muscat to maintain it?