A very brief introduction to MEI - the Music Encoding Initiative
And case studies dealing with mixed verbal-musical content for TEI-Publisher

Presented at the E-Editiones Community Meetup
8 July 2020

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1999: Perry Roland (Univ. of Virginia) creates an XML schema (DTD) for the representation of music notation, drawing on the same principles of the TEI. First public presentation in 2000.


Administratively based at the Akademie der Wissenschaften und der Literatur in Mainz.

Currently in preparation v5 of the Guidelines.

Around 400 members worldwide, specialists from various music research communities, including technologists, librarians, historians, and theorists.

GitHub: https://github.com/music-encoding

Contacts: https://music-encoding.org/community/community-contacts.html
“MEI, like the TEI, is an umbrella term to simultaneously describe an organization, a research community, and a markup language. It closely mirrors work done by text scholars in the TEI and, while the two encoding initiatives are not formally related, they share many common characteristics and development practices.”

MEI, similarly to TEI

“is designed by the scholarly community for scholarly uses”

“has a modular structure that permits use dependent on the goals of scholars”

“enables common functions of traditional facsimile, critical, and performance editions”
MEI, similarly to TEI

- uses ODD for both the specifications and the guidelines [https://music-encoding.org/resources/background.html](https://music-encoding.org/resources/background.html)
- the modular structure permits to focus on the needs of specific users [https://music-encoding.org/resources/schemas.html](https://music-encoding.org/resources/schemas.html)
- Interest Groups work on the intellectual content about specific topics, at their own pace [https://music-encoding.org/community/interest-groups.html](https://music-encoding.org/community/interest-groups.html)
- a Technical Team deals with the implementation of what has been agreed [https://music-encoding.org/community/technical-team.html](https://music-encoding.org/community/technical-team.html)
- provides a customisation service [https://meigarage.edirom.de/profiler](https://meigarage.edirom.de/profiler)
- a ‘lite’ version is in-progress (due to the exponential grow of the specs)
MEI, similarly to TEI

MEI borrows a number of tags from TEI when dealing with mark-up of metadata, verbal content, apparatus, linkage mechanisms etc.

Just a few examples (from the Guidelines https://music-encoding.org/guidelines/v4):

- **root document**: `<mei>`
- **header**: `<meiHead>`
  - where several MEI-like tags are used for metadata
- **content divisions**: `<front> <body> <back> <mdiv>`
- **editorial**: `<del> <add> <subst>`
  - `<sic> <corr> <orig> <reg>` within `<choice>`
- **critical**: `<app> <rdg> <lem>`
- **facsimile**: `<facsimile> <surface> <zone>`
- **pointers**: `<ptr> <ref>`
- **encoding of verbal text (structures and content)**: `<div> <p> <rend> <list> <table> <quote> <lg> <name> <date> and more!`
One quite big difference between MEI and TEI

Differently from what happens with verbal text in TEI (where characters, words, phrases are marked-up), the musical text (the notation) is also expressed via XML elements and attributes.

<note> is the smallest content unit (along with <rest>) with attributes describing their parameters (pitch, duration etc.) or the presence of accidentals or ornaments.

```xml
<measure n="1">
  <staff>
    <layer>
      <note dur="8" oct="4" pname="c"/>
      <note dur="8" oct="4" pname="e" accid="f"/>
      <note dur="8" oct="4" pname="g"/>
      <rest dur="8"/>
    </layer>
    <chord dur="1">
      <note oct="5" pname="c"/>
      <note oct="5" pname="e" accid="f"/>
      <note oct="5" pname="g"/>
    </chord>
  </layer>
</staff>
</measure>
```

then individual notes can be grouped for example in a <chord> and are identified as being part of a stream of music events that MEI calls a <layer> which minimal division (in common Western notation) would be a <measure> graphically represented on a musical <staff> where on a larger scale the clef, tempo, dynamics, etc. will be further specified.
**MEI vs other encoding systems**

MEI is only one of the systems created to encode music... nor is the only one in XML.

FAQ: How **MEI** is different from **MusicXML**, the widely used XML music encoding format?

“Both MusicXML and MEI encode music notation (notes, staves, rests, clefs, etc.), and they are both expressed in XML. However, they are guided by two different philosophies.”

“The goal of MusicXML is to be an *interchange format* between notation editors.”

“MEI contains the same functionality in terms of notation and page layout, but beyond this it can also *encode information about the notation and its meaning* in a *structured* and *systematic* way. In this way, MEI *can also support non-standard notations* such as early music notations, and not just through visual emulation, but by *retaining and representing structure and semantics*. In addition, MEI can record the relationships between notational features and digital page images and audio recordings”

(from: [https://music-encoding.org/about](https://music-encoding.org/about))
To conclude, about differences and similarities...

MEI encodes the musical text in XML (similarly to MusicXML) but (as TEI) encodes primarily the meaning, then allows for multiple layers of annotations

- about the visual aspects of a musical piece, and/or a physical copy of a score
- metadata information and linkage to other information
- editorial markup
What MEI is mostly used for

MEI was designed to specialize in the encoding of music documents, hence the data that MEI encodes is predominantly music notation; any verbal component is either a secondary feature of the score, or is metadata.

1. What MEI is mostly used is to create *transcriptions/editions of music pieces* (in various flavors: diplomatic, critical, performative), to be then processed for rendering, or for analytical purposes, for linkage with other documents etc.

Note that MEI adds some support for verbal content because

- music scores contain performance indications
- vocal music deals with text to be sung
What MEI is mostly used for

2. Other popular applications of MEI are those producing **bibliographies, catalogs, and other library science-based applications**.

(to simplify it to a bare minimum, here the metadata encoding is mostly used, for each piece of the composer Carl Nielsen)

On the right: The *Metadata Editor and Repository for MEI Data* (MerMEId). An environment for managing data. (Here also used to present the data)
The MEI community has been very keen in defining encoding practices. Consider that music notation is a very complex system, quite abstract, and with many dialects and flavors developed since the medieval times and scholars are encoding in MEI because of its advance features, even it is still difficult, if not impossible, to render graphically all the nuances of the encoding. In fact, very sophisticated processors and rendering mechanisms are required for the various forms of notations, since MEI encodes not (or not only) a symbol or a shape but the meaning of the symbols and the logic that brings them together in a piece of music.

A big step forward has been the creation of the Verovio music engraving library

“Verovio is a fast, portable and lightweight library for engraving MEI music scores into SVG. Verovio can be used as a standalone command-line tool for converting a MEI files, as the music rendering library for applications, or it can be compiled to Javascript using the Emscripten LLVM-to-JavaScript compiler.”

GitHub: https://github.com/rism-ch/verovio   Website: https://www.verovio.org
Less common scenarios: mixed content

Examples include music treatises, composers’ letters quoting musical phrases... opera librettos and listening guides, scholarly papers (not necessarily musicology) including snippets of music notation...

Hans von Wolzogen, 
Tristan und Isolde. Ein thematischer Leitfaden durch Dichtung und Musik (1880)

Arnold Schoenberg, 
Harmonielehre, 1922

verzeichnet. Die zartesten Anregungen vermag eine Empfindlichkeit zu erreichen, während Gebläse sie zerstört. Diesen zartesten Anregungen nachzuhören, die der Dichter haben will, nur wenn er das Lauten hört, ist für den wahren Improvisator starke Verlockung. Das Leise, kaum Hörbares, darum Mysteriöses zieht ihn an, setzt neue Neugierde, zu kosten, was nie versucht wurde. So ist also die Neigung des Unehörten, sich dem Suchenden zu offenbaren, ebenso groß, wie die Neigung des Suchenden, das Unerhörte zu finden. Und in diesem Sinne ist jeder wahrhaft große Künstler Improvisator: feinste Reaktion auf die kleinsten Anregungen offenbart ihm das Unehörte, das Neue.

Besonders auffällig zeigt sich das bei Debussy. Mit so großer Kraft setzt sein Impressionismus auch die Quartenakkorde hin, da sie unzureichend verbunden scheinen mit dem Neuen, das er sucht, und mit Recht als sein geistiges Eigentum gelten könnten, obwohl sich nachweisen läßt, daß vor und gleichzeitig mit ihm Ähnliches geschrieben wurde. Vielleicht trägt auch hierzu bei, daß sie Naturstimmen ausdrücken; denn, als ob die Natur so redete, klingt es allerdings. Und daß gegen deren Sprache alles andere zurücktritt, leuchtet ein.

Wie wahrscheinlich mancher anderes, habe auch ich Quartenakkorde geschrieben, ohne Debussys Musik gehört zu haben. Vielleicht sogar früher, sicher aber zur gleichen Zeit wie er. Soviel ich weiß, zum erstenmal in meiner schon erwähnten symphonischen Dichtung „Pelikan und Meisen“. 

Ganz vereinzelt kommen sie dort ein einziges Mal vor als Ausdruck einer Stimmung, deren Besonderheit mich wider Willen ein mir neuen Ausdrucksmittel gefunden ließ. Wider Willen, ich weiß noch heute, daß ich gezogene habe, diesen Klang zu notieren. Die Dichtlichkeit, mit der er sich mir aber anfühlte, machte es unmöglich, ihn abzuweisen. Dann habe ich lange nachher erst in meiner Kammersymphonie die Quartenakkorde wieder aufgenommen, ohne mich zu deren Fall zu erinnern, und ohne Debussys oder Dukls Musik irwischen kennen
Less common scenarios: mixed content, verbal and musical

The following slides will illustrate cases in which historical materials with verbal and musical content, if encoded with the *granularity required by complex scholarly projects*, require the use of both TEI an MEI.

Solutions exist to deal with this situation, but they are not ideal...

We are looking at **TEI-Publisher** as an environment that

- is easy to set up?
- renders TEI and MEI files?
- automatically matches links?
- allows to integrate facsimiles and (music) editions?
- (further) allows to annotate included facsimiles? (see appendix »[hybrid editions](hybrid-editions)«)
Use case 1: Dealing with TEI and MEI in a PhD project (Baumann-Digital)

Trying to document and describe mixed types of documents while studying life and works of a composer (Ludwig Baumann, 1866–1944).

Dealing with:

- **TEI** – for text sources
  - letters (transcriptions)
  - historical periodicals (partwise transcriptions)
- **MEI** – almost catalogue data
  - Sources descriptions (Metadata, incipits)
  - work descriptions (MEI-Metadata, maybe incipits)
  - Editions (MEI-Metadata, facsimiles, critical annotations, MEI-Body)

**Problem**: Management systems for MEI-Metadata (e.g. MerMEId) are powerful but not easy to set up.

**Quick solution**: Programming a tiny app for eXist-db to visualize and link data (for proofread and basic analyses). *Why?* Because of less capacity for technical issues in my one-man-project.

**FYI**: An extended version of the BaudiApp is used by Joachim-Raff-Archiv (CH) [http://portal.raff-archiv.ch/index.html#portal](http://portal.raff-archiv.ch/index.html#portal)
Use case 2: music treatises

*Thesaurus Musicarum Latinarum* [http://www.chmtl.indiana.edu/tml/](http://www.chmtl.indiana.edu/tml/)
*(and sisters projects, dealing with treatises in other languages e.g. [http://www.chmtl.indiana.edu/tfm/](http://www.chmtl.indiana.edu/tfm/)*)

- plain text repositories created in the 1990s
- currently >1100 texts, dating 9th-17th century, in a MySQL database
- in progress: verbal texts are being encoded in TEI
Use case 2: music treatises

- musical examples (interleaved with the text)
  - currently: presented as graphics (scans from sources)
  - were also encoded in a custom-made code (discontinued)
  - current tests underway: MEI encoding (depending on support of all notation types)

A separate project: integration of manuscript descriptions and IIIF facsimiles
Use case 2: music treatises

Prototype (2017) for the whole TML archive using XTF [https://xtf.cdlib.org/]
(pros: a database using Lucene / cons: still supported? integration of MEI possible?)
Use case 2: music treatises

Work in-progress towards a prototype for single multilayered editions using a custom-made React app displaying TEI heavily marked up text + MEI in the browser (developer: Raffaele Viglianti of MITH)

(pros: it works! quite simple deployment in a static website; cons: not a database, hence no queries...)

Nota che due sono le prolationi di canto figurato
Anonymous

Arezzo, Biblioteca della Città, 216, fols. 36r-39v

Diplomatic transcription 1 | Diplomatic transcription 2 | Edition 1 | Edition 2
--- | --- | --- | ---
dipl1, dipl2, mod1, mod2

Osta eh due sono le prolationi di chitar figurato cioe p-fecto 7 infpecto 7 infiecto magiore 7 minore: ecco molti che dichiano che le sono quattro: Cioe pfecto minore 7 infpecto minore 7 pfecto magiore 7 infpecto magiore: ma e una medesima: chosa per tutto torna auno efecto: Torniamo alla prima pie eh due sono le prolationi: magior 7 minore pfecto 7 infpecto: Et queste prolationi sono sotto asse ne note: 7 qvste sono maxia longha breuie simbriuee minia: siminimum: equesti sono enomi loro ora resta audere chome sono figurate: Lexemplo loro:

Queste figurate si figurano in questa forma chome uedi nello esempio disopra ma possonsi legare insieme chö altre note cioe maxima chon longha chö breuie: breuie chö simbriuee minima 7 siminimum nö sipossono trasfigurare chome apàuli-te p lo exèplio uedai 7 molte figure sono chö sono leghate isteme che sono tutte breui quale maxime 7 quale longhe 7 quali semi breui lenaxime nö si possono molto mutare ne trasfigurare ch sono diloro natura grade 7 giuste: Eccì molte note leghate insieme chö qh tu trouassi un cèinaiq diquadre saglièo sàca cho da alcuna tutte sono breui: Et qh tu trouassi simiènte altre-
Musical notation in TEI: how come?

TEI Guidelines, 14.3: “Notated Music in Written Text”

notatedMusic provides a way to signal the presence of music notation in text, but defer to other representations, which are not covered by the TEI guidelines, to describe the music notation itself. [...] It is a container element to encode the occurrence of music notation and allows linking to the data format preferred by the encoder. (Note: notatedMusic is not the same as musicNotation, a metadata element, which is used to describe musical notation that appears in a manuscript.

The following elements can be used for encoding music notation in text:

- **notatedMusic** encodes the presence of music notation in a text
- **ptr** (pointer) defines a pointer to another location.
- **desc** (description) contains a brief description of the object documented by its parent element [...] 
- **graphic** indicates the location of a graphic or illustration, either forming part of a text, or providing an image of it.
- **binaryObject** provides encoded binary data representing an inline graphic, audio, video or other object.
currently the prototype app defaults to a graphic if present, (when rendering of the MEI file is not satisfactory). Otherwise Verovio displays the notation (svg).
Conclusions

Once more, TEI-Publisher as an environment that ...

- is easy to set up?
- renders TEI and MEI files?
- automatically matches links?
- allows to integrate facsimiles and (music) editions?
- (further) allows to annotate included facsimiles? (see »hybrid editions«)
Appendix – Hybrid Editions

● Reger-Werkausgabe (www.reger-werkausgabe.de, online version starting ca. August 2020)
● Opera (http://www.opera-edition.com/)

The named projects use an environment called Edirom (https://www.edirom.de/) for creating interactive critical editions.

Edirom is a java and xquery based app that allows to include facsimiles, critical annotations and some other stuff.

It is also possible to add encoded music and to render it using Verovio.

* Freischütz-Digital is a digital and NOT a hybrid Edition. It is named here because it was the initializing Project for Edirom and has an online demonstrator.
Appendix - Music notation can be found elsewhere!

Carlo Carrà, *Rapporto di un nottambulo milanese* (1914) @MoMa

Notation knives (16th century) @ Fitzwilliam Museum, Cambridge

Pablo Picasso, *Guitare, feuille de musique et verre* (1922)