



Musical Maps of the 21st Century

Leveraging Open Access platforms to create
music research tools for the new age



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Impetus for the Development of Musical Maps Prototype

- There are numerous examples demonstrating the value of visualization tools in historical research and pedagogy.
- Interactive visualizations can function as interfaces for exploratory analysis and search interfaces that facilitate discovery and research
- Visual search and visualizations are increasingly employed in humanities projects broadly and have yet to gain significant traction in the fields of musicology, music education, and music librarianship.
- In the last several years, music librarians have discussed and documented the emerging need for greater access to digital scholarly resources and musicology.

Proposal for the Development of Musical Maps Prototype

Mission:

Our mission is to develop an interactive, digital tool that maps the migration of music and musical ideas over time and space using GIS platforms, as well as a timeline function to visualize historical progressions, and finally, the added validity of controlled vocabularies and data harvested from authoritative sources. Through these visualizations, we also seek to facilitate the work of musicians and musicologists in making connections between musical concepts and people. To this end, we have identified a team of specialists with the expertise to develop such a tool combining the functionality of several existing platforms with the added framework of controlled vocabulary and authoritative data.



Goals for the Development of Musical Maps Prototype

Phase I

- Design and create an innovative and valuable resource that would facilitate research on the origins and migration of music and musical ideas across time and space.

Phase II

- Engage a worldwide network of music librarians and historians to populate the resources' data sets using authoritative sources from their own collections and archives.

Phase III

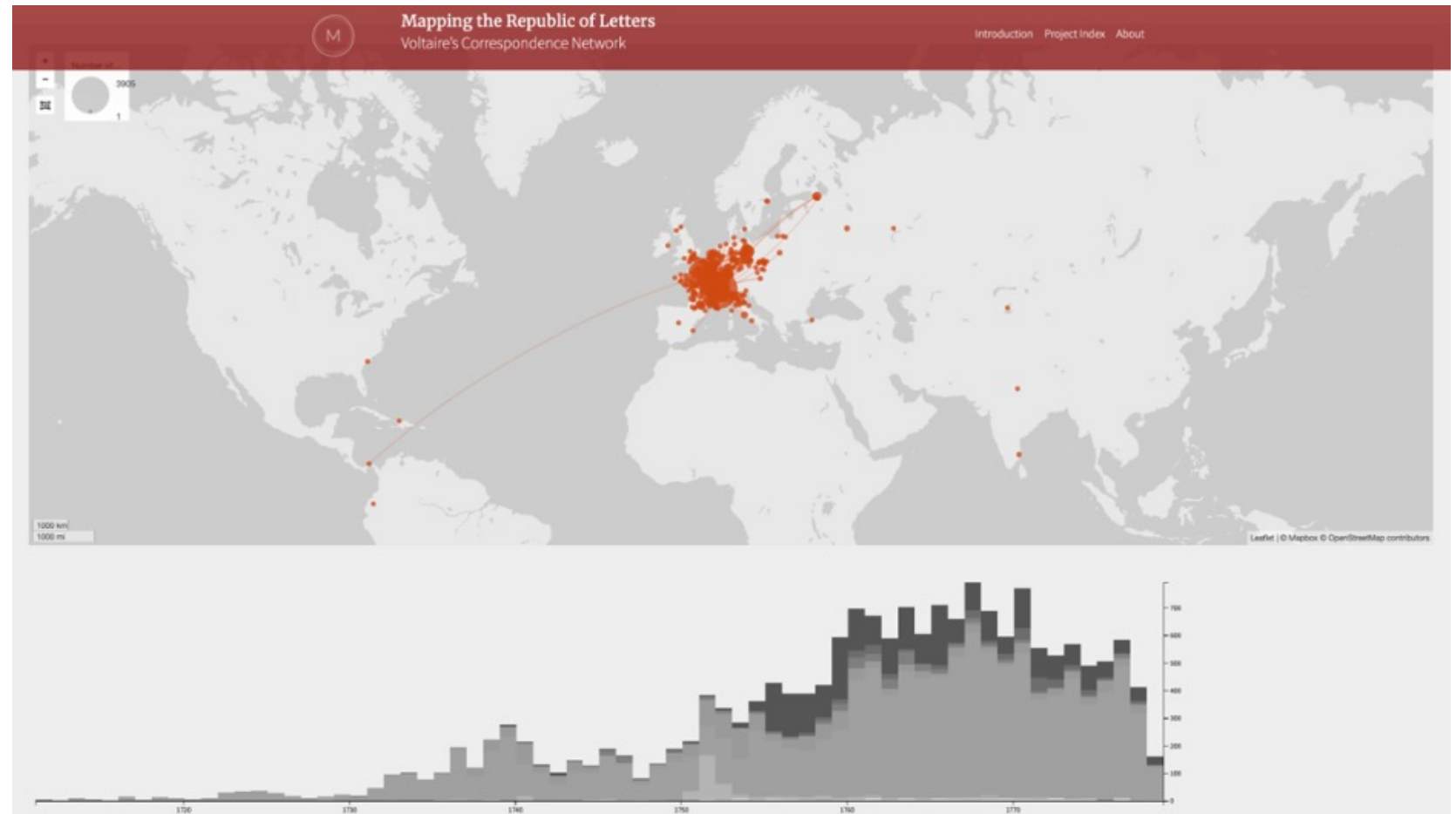
- Provide as much open access to the resource as proprietary content would enable us to do so.

Phase IV

- Market the resources and create instructional materials to allow others to use the source for research and discovery.

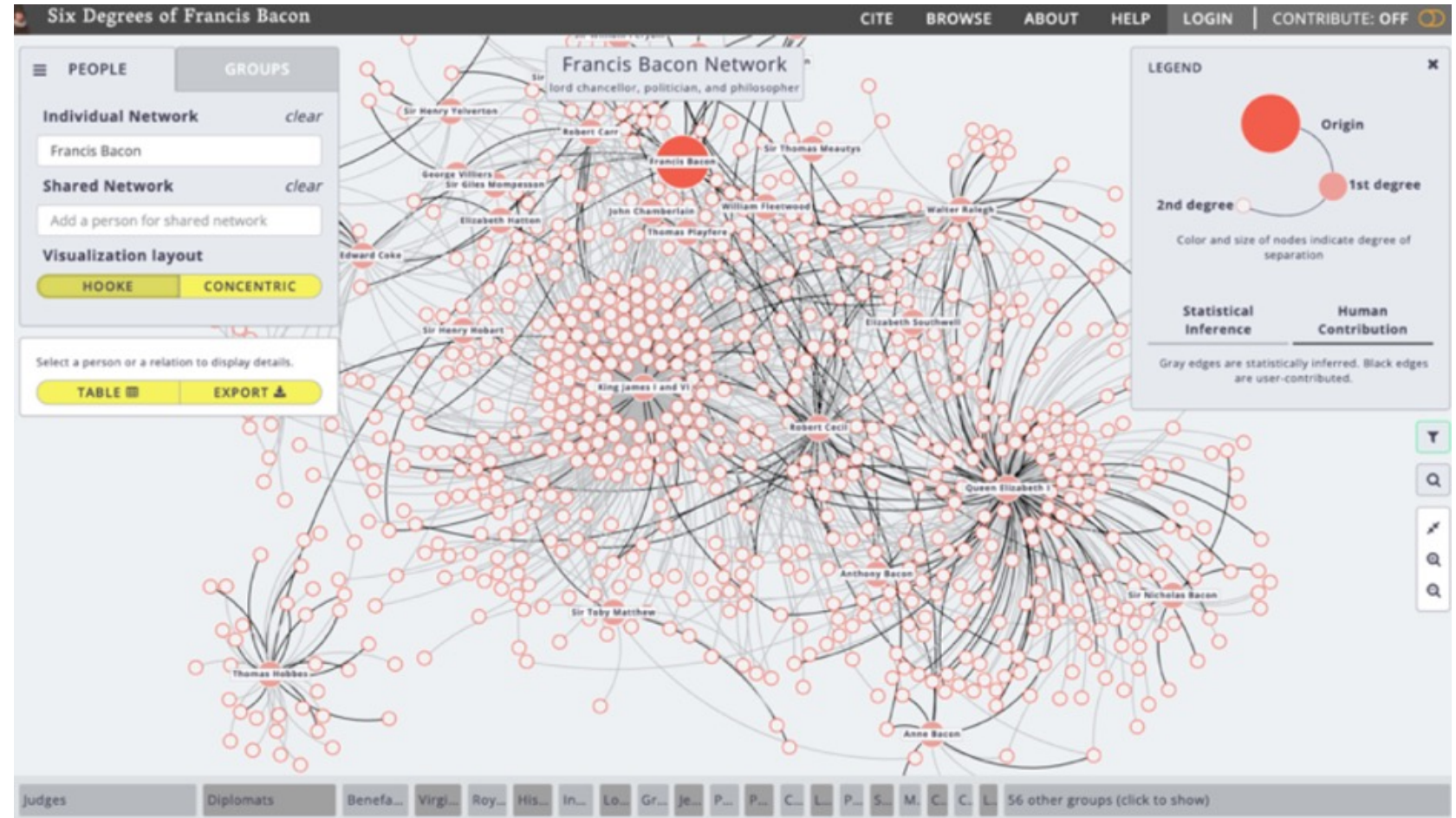
Inspiration from similar efforts in the digital humanities

Figure 1: Map and histogram of *Voltaire's Correspondences* by Dan Edelstein using Stanford University's *Palladio*.



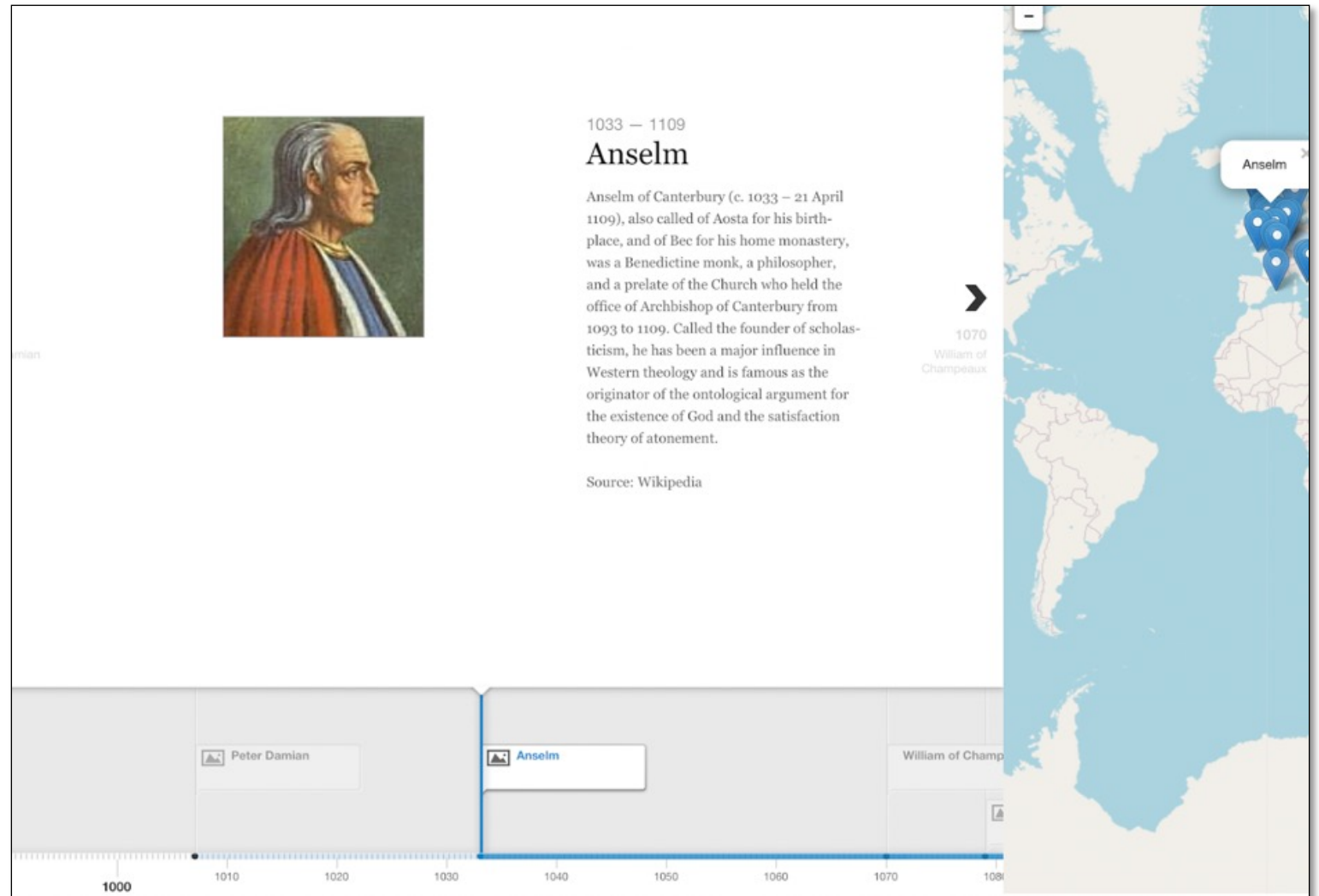
Inspiration from similar efforts in the digital humanities

Figure 2: Network graph of the *Six Degrees of Francis Bacon* showing over 4,000 data points and the user contribution feature.



Inspiration from similar efforts in the digital humanities

Figure 3: A resource offering a timeline and map of Medieval Philosophers using TimeMapper, <https://timemapper.okfnlabs.org/okfn/medieval-philosophers#1>. Please note the data source for this tool is listed as Wikipedia. While there are overlaps of historical figures in the timeline, the inability to map physical intersections is a limitation of the platform.



Inspiration from similar efforts in the digital humanities

Figure 4: A model mapping Kircher's correspondence using Stanford University's Palladio visualization tool from Iva Lelková, Paula Findlen, and Suzanne Sutherland, "Kircher's Bohemia: Jesuit Networks and Habsburg Patronage in the Seventeenth Century," *Erudition and the Republic of Letters* 5, no. 2 (2020): pp. 163-206, <https://doi.org/10.1163/24055069-00502002>.



In 2020, a team of Czech historians analyzed the relationship between the Jesuit polymath Athanasius Kircher (1602–1680) and his correspondents in Bohemia and elsewhere in Central Europe. By analyzing data from Kircher's correspondence with the Palladio visualization tool, we discovered a remarkable number of letters that had been sent from Bohemia. The authors assert that the connections made using the Palladio platform, the work to trace the migration of the correspondents would have proven much more difficult and may have prevented the discovery of key letters.



**What similar utilities exist
in music?**

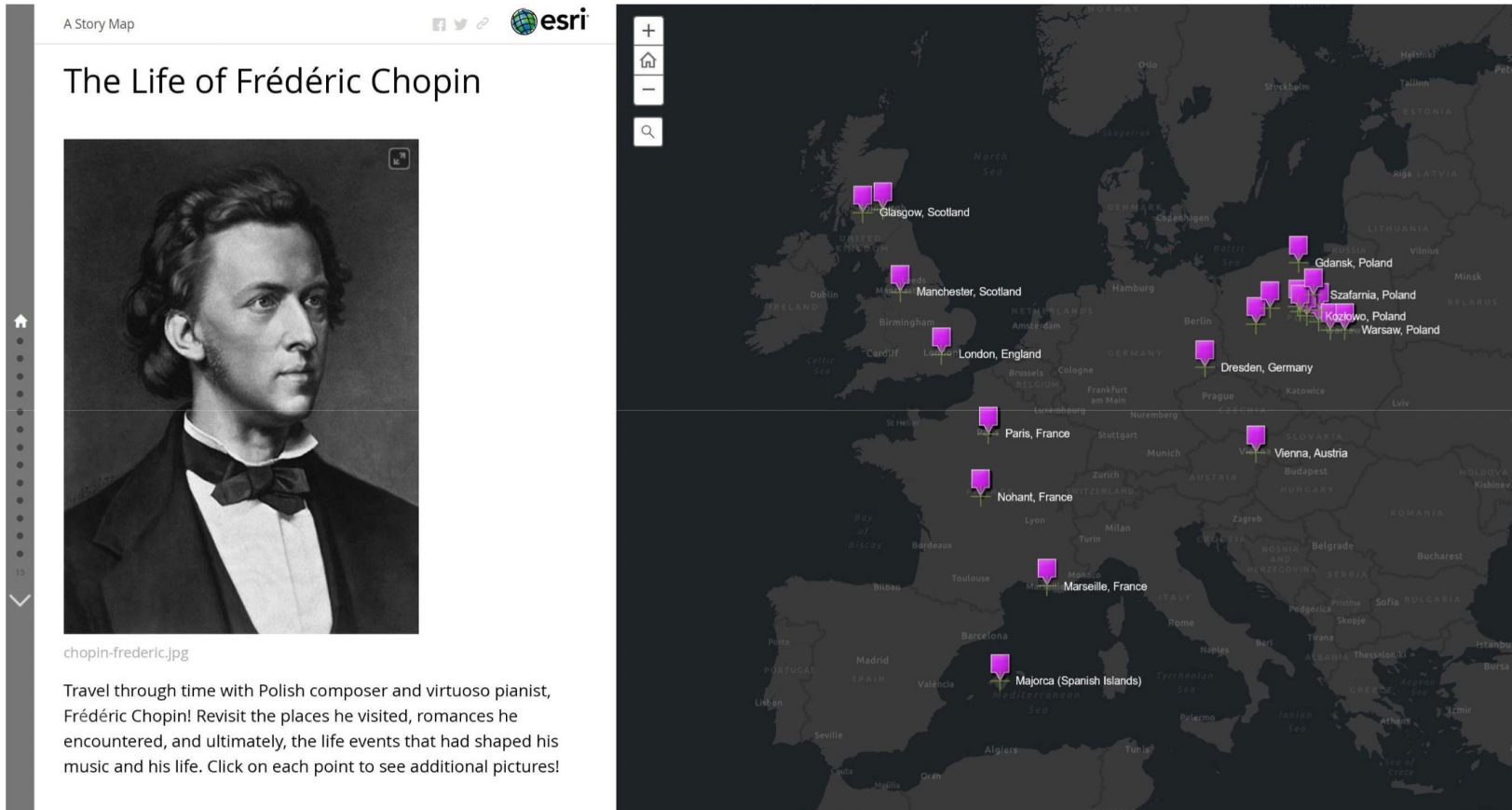


Figure 5: Chopin StoryMap created with ArcGIS Desktop. <https://prism.ucalgary.ca/server/api/core/bitstreams/824e697e-3c8b-4d5e-b74a-921cad3a12f4/content>

Inspiration from similar efforts in music

- Work on this project ceased in 2019.
- The author lamented that, “with a greater duration for the project, footsteps of multiple composers could be depicted, establishing the influence one composer had on another. This would clearly show the dissemination of ideas and interconnectedness of the music world, giving users a better understanding of how music evolved throughout the years.”

Figure 2: StoryMap Layout – Example Slide Complete with Text Alongside Photos/Videos

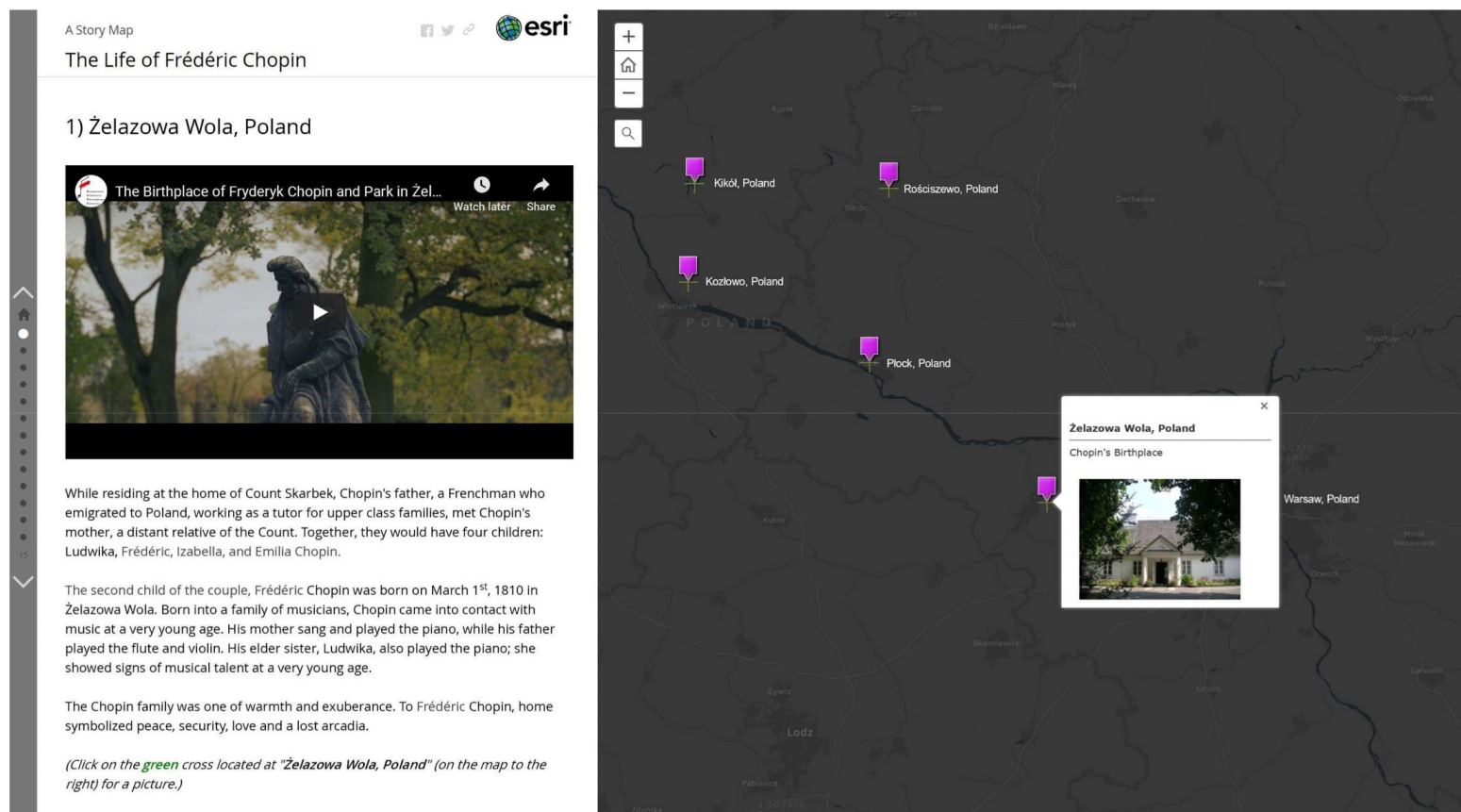


Figure 5b: Chopin StoryMap created with ArcGIS

Desktop. <https://prism.ucalgary.ca/server/api/core/bitstreams/824e697e-3c8b-4d5e-b74a-921cad3a12f4/content>

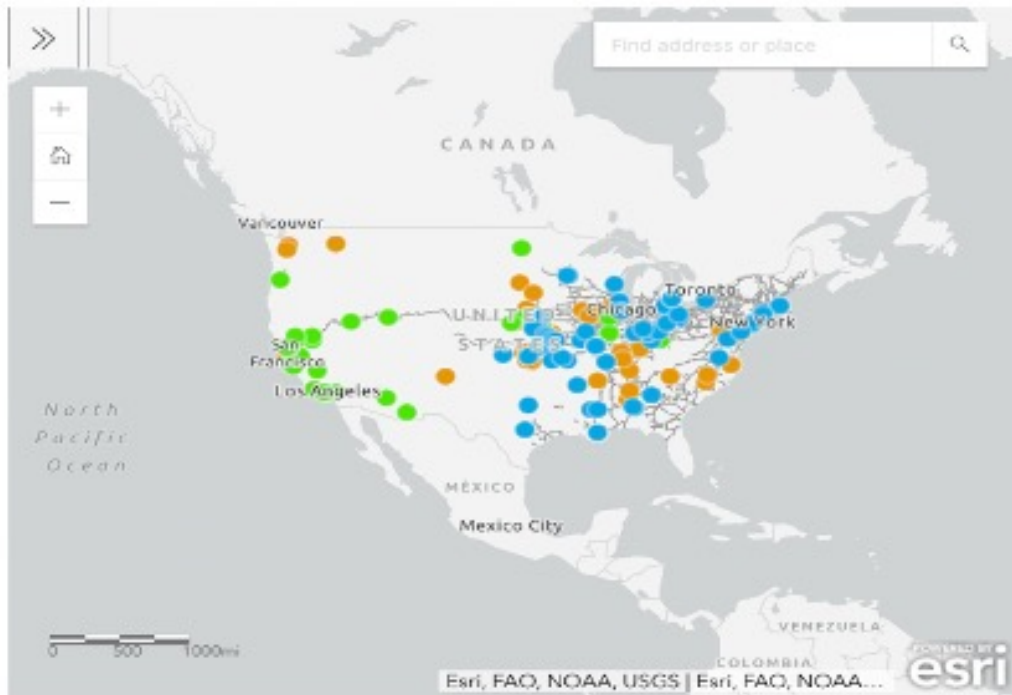
Inspiration from similar efforts in music

- Numerous challenges in populating data sets from authorized sources.
- Unverified sources of data throughout the internet.
- Imperative to only use data from primary sources and/or critical studies to maintain the highest level of scholarship.
- Librarians can play an essential role in using the development of data sets using authorized records and primary source materials.

Inspiration from similar efforts in music

Figure 6: These maps created through the Musical Geography Project (2015) show where Black minstrel troupes performed from 1871 until 1939.

Black-Managed Locations

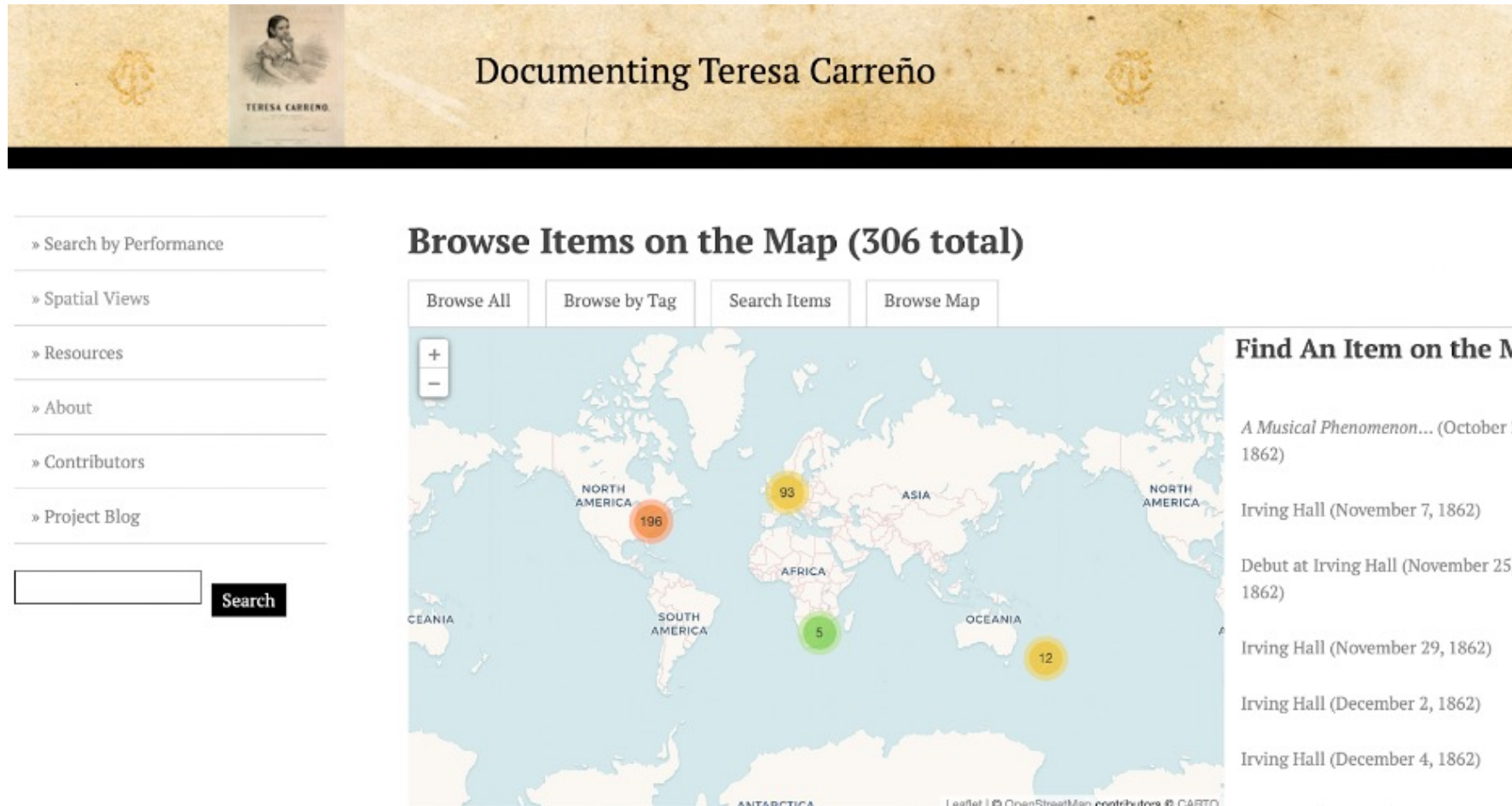


White-Managed Locations



Inspiration from similar efforts in music

Figure 7: Music Librarian Anna Kijas's Map representation, *Documenting Teresa Carreño* of the location of primary sources related to her life and work.



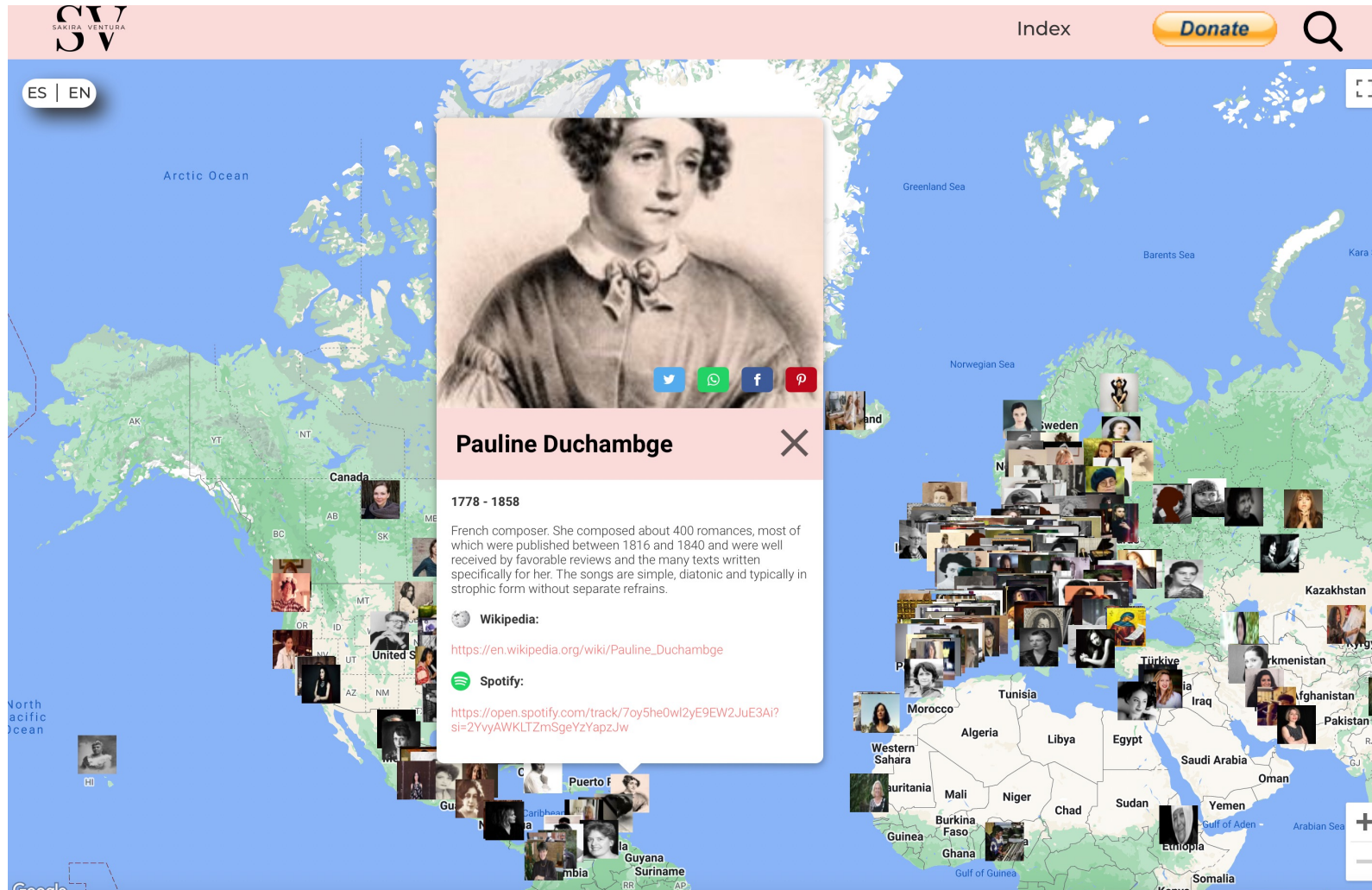
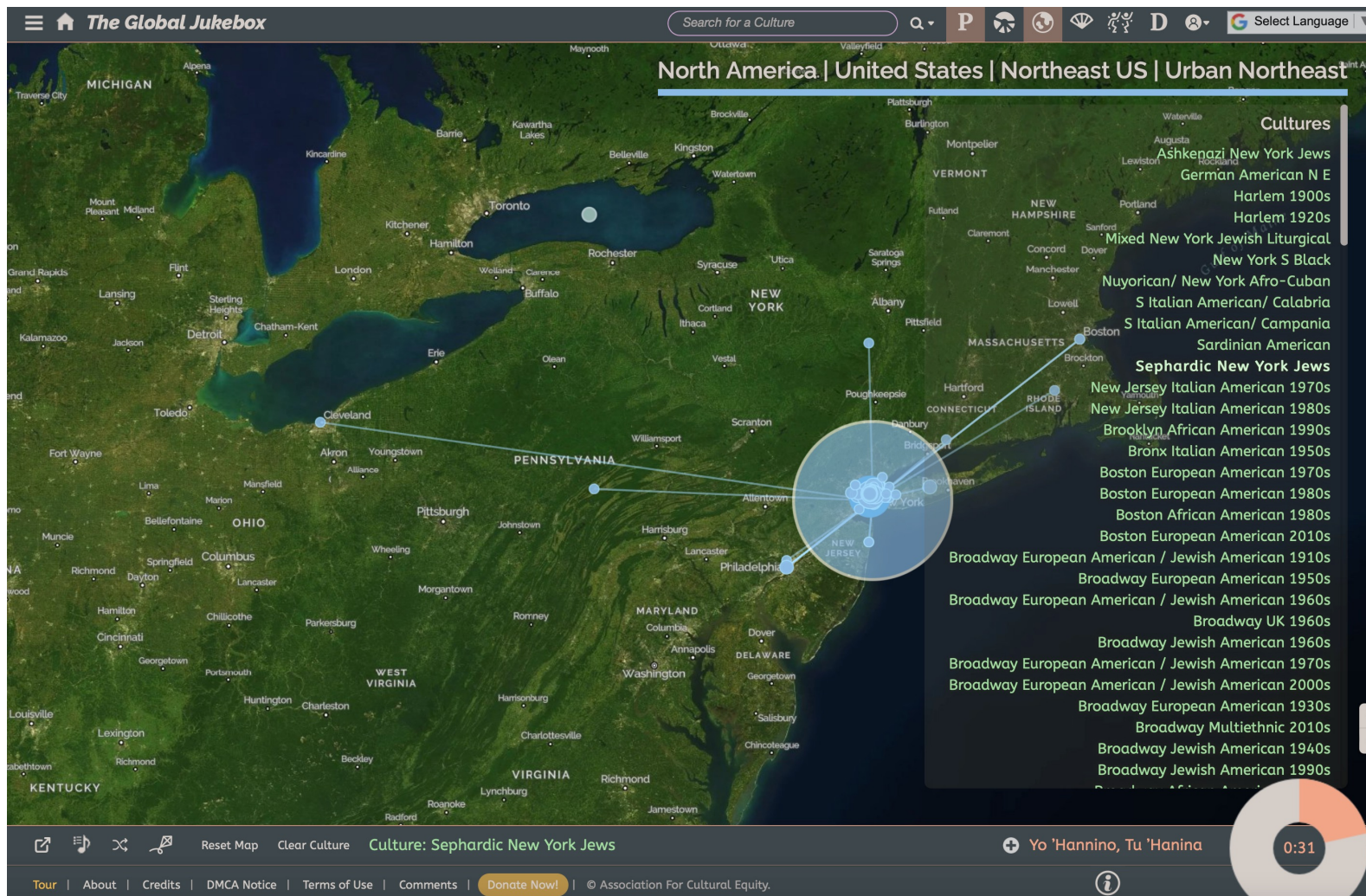


Figure 8: This Global Map of Women created by Sakira Ventura.

Inspiration from similar efforts in music

- Represents important visuals for notable women throughout the world.
- Unverified sources such as Wikipedia and commercial platforms (e.g. YouTube or Spotify) for streamed audio and video.



Inspiration from similar efforts in music

- The NEH funded *Global Jukebox* (2010) project contains folk and indigenous music recordings.
- Described and annotated by musical style, point of origin, and geographic spread.
- The site provides interactive maps that can be navigated by cultures, nations, or musical style.
- Educational materials like lesson plans and presentations are provided.

Figure 9: The NEH funded *Global Jukebox* allows users to discover the origins of folk and indigenous music, mapping its dissemination across space. In addition to the visual representation of the migration of this music, audio recordings of the music described are accessible for streaming. Association for Cultural Equity. “The Global Jukebox.” Accessed May 4, 2023. <https://theglobaljukebox.org/>

Principles for the Development of Musical Maps

Data set populated by librarians using authoritative and/or primary sources from collections.

- Evidence may include primary source materials (images) and/or citations
- Data is entered based by events/appearances (e.g., birth, death, education, performance given, performance attended, residence, employment, etc.).

Controlled vocabulary, standardized descriptions, and facet searching to optimize precision and recall.

- Library of Congress authority records used for personal/corporate names and topical subject headings (e.g., piano, cello [formerly violoncello], sonatas
- GeoNames used for representation of places and musical landmarks.

Meaningful output that clearly reflects the intersection of music, musicians and musical ideas.

- Visualizations must accurately represent the migration of a musical person, place, or thing over time and space.
- Multiples timelines should overlay to bring out connections between two or more musical persons, places, or things.

Principles for the Development of Musical Maps

Data Sets Populated by Librarians

- Librarians, now more than ever, must lead the charge to validate information for accuracy and authority.
- Providing primary source evidence and/or citations from authoritative library resources for each entry is central to the mission of creating trustworthy visualizations and accounts of historical events.
- For the *Musical Maps* tool, archives from library collections serve to validate data and provide greater access and use of these collections to a worldwide network of researchers.

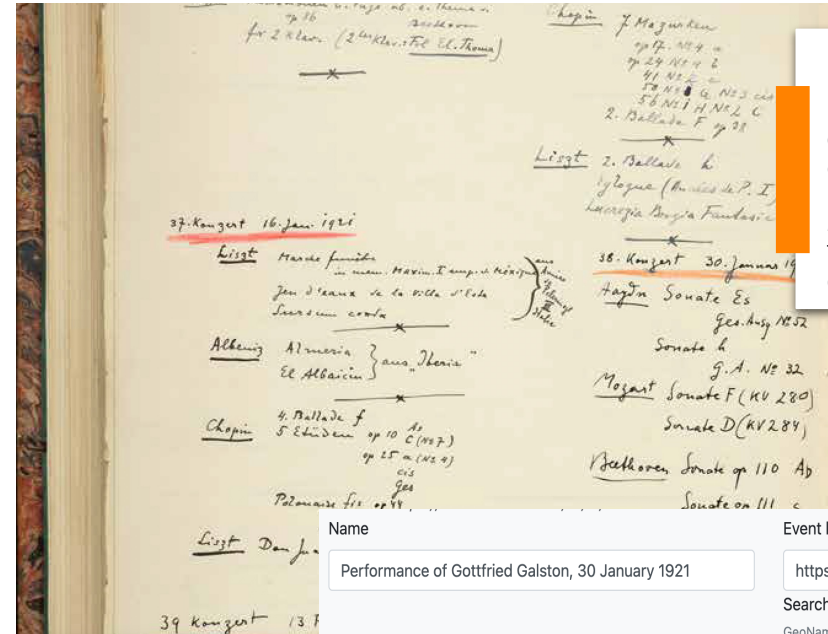


Figure 10: Handwritten program (by Galston) of Gottfried Galston's cycle of over 40 recitals in Munich dating from October 1919 to February 1921. From the *Galston-Busoni Archives* in the University of Tennessee Libraries Special Collections.

Name	Performance of Gottfried Galston, 30 January 1921
Event location	https://www.geonames.org/2867714/munich.html
Search GeoNames	GeoNames URI: "https://www.geonames.org/#####/CITY.html"
Exact date	01/30/1921
Description	Piano recital in Munich as part of a weekly series of over 40 performances by Gottfried Galston dating from October 1919 until February of 1921. Program included: Haydn: Sonate Es (ges. Aug. No. 52) [and] Sonate h (g.A. No 32) Mozart: Sonate F (KV 280) [and] Sonate D (KV 284) Beethoven: Sonate, op. 110 A ^b and Sonate, op. 111 c

Figure 11: Data entry form populated from information derived from primary resources at the University of Tennessee Libraries.

Principles for the Development of Musical Maps

Controlled Vocabulary & Standardized Descriptions

Events

Creator id
Ex. Shepas_TKN

Type of event (DATA DICTIONARY) (Repeatable)
Ex. Birth

Associated with personal, corporate, or meeting name (LOC NAR): (Repeatable)
Ex. Galston, Gottfried, 1879-1950

Place of event (GeoNames)
Ex. Peregringasse, Vienna
(latitude and longitude from GeoNames)

Associated with (thing) Name from LCSH topical subject heading or LC Name Title Authority Record (Repeatable)

Date of event (yyyy/mm/dd with drop down calendar)
Ex. 1879/08/31

Range date
Ex. 1820-1830

Reference(s):

People

Creator id
Ex. Shepas_TKN

Name from authority record (LC-NAR)
Ex. Galston, Gottfried, 1879-1950
NAR: <https://lccn.loc.gov/n79011997>

Name displayed as
Ex. Gottfried Galston

Student of (Name from authority record) (Repeatable)
Ex. Busoni, Ferruccio, 1866-1924
NAR: <http://id.loc.gov/authorities/names/n79124601>

Reference(s): Tamara Levitz, "Ferruccio Busoni and His European Circle in Berlin in the Early Weimar Republic," *Revista de Musicologia*, 16, no. 6 (1993): 3705-3721.

Students taught (Name from authority record) (Repeatable)
Ex. Carter-Zagorski, Patricia
NAR: <https://lccn.loc.gov/no2004110865>
Reference(s): Interview with Patricia Carter-Zagorski, April 15, 2021.

primary occupation(s) (controlled designators in a drop-down menu)
Ex. instrumentalist (piano)
Ex. pedagogue

References:
Ex. https://scout.lib.utk.edu/repositories/2/archival_objects/176452
Notes: In UTK special collections

secondary occupation(s) (controlled designators in a drop-down menu) (Repeatable)
Ex. composer
Reference(s):

Instrument (s) (topical LCSH (Repeatable)
Ex. piano
Reference(s):

Vocal Range (controlled designators in a drop-down menu (Repeatable)
Ex. Baritone

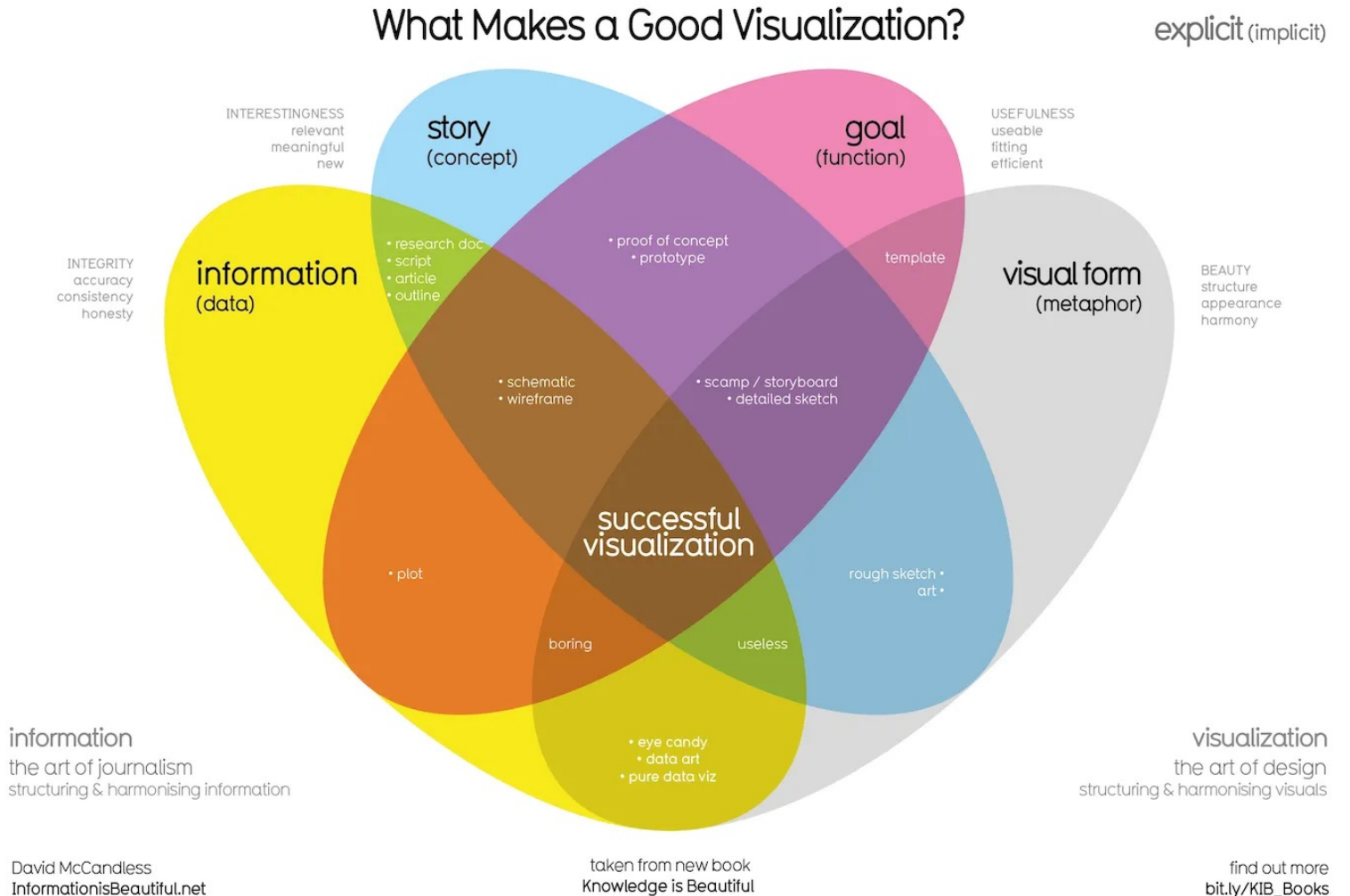
Principles for the Development of Musical Maps

Meaningful Output:

According to award-winning author, David McCandless¹, a successful visualization:

- Contains reliable information
- Tells a story
- Achieves a goal
- Relays the message in a visual form

1. InformationisBeautiful.net



Principles for the Development of Musical Maps

Meaningful Output:

The University of Tennessee Libraries contracted a team of IT Architects and Developers from Saint Louis University to bring the idea of the Librarians' Musical Map to fruition. In addition to exploring a multitude of open access software and existing utilities, the team has been working to design a prototype that meets the parameters for the data sets, controlled vocabularies, descriptors, and output needed for use by researchers, pedagogues, practitioners, and students.



Patrick Cuba

IT Architect
Walter J. Ong, S.J., Center for Digital Humanities

Practice Areas

Cuba is the IT Architect for the Walter J. Ong, S.J., Center for Digital Humanities at Saint Louis University. Notable contributions include the IIIF community (founding membership, Technical Review Committee representative), design and code for the Mirador IIIF Viewer software (and Rerum Inbox Linked Data Notification Plugin), TPEN transcription tool, and the Rerum entity annotation ecosystem. He has consulted for broad audiences, including the Botanical Heritage Library and the Federal Reserve, on considering the benefits of IIIF implementation and annotation standards. Presentations, workshops, and seminars across technical and scholarly audiences have focused on digital tool interface design and the power of annotation to encode the ambiguity of academic conversation around even non-digital and undigitized resources.



Bryan Haberberger

Full Stack Developer
Walter J. Ong, S.J., Center for Digital Humanities

Practice Areas

Haberberger is a Full Stack Developer for the Walter J. Ong, S.J., Center for Digital Humanities at Saint Louis University. Prominent contributions include code for image tools in the Mirador viewer, TPEN 2.8 transcription tool, Italian Paleography and French Paleography tool for Newberry Paleography, a Spectral (Web)RTI Plugin for ImageJ, the RERUM API and the RERUM Back End systems. He has a focus on intersecting scholarly and technical resources and personnel in ways that advance and enrich software initiatives for researchers and audiences of all grades. Consultations, presentations and workshops are geared to help achieve these ends through standards that drive data and interface interoperability.

Principles for the Development of Musical Maps

Meaningful output

- People entered using LOC authority records will result in all the life events, documents, and related people, things, and places the person is associated with.
- Option to view on the interactive map will exist.

MUSICAL MAP
University of Tennessee-Knoxville

[View Collections](#)[People](#)

Gottfried Galston

Life Events

Birth Date: 31 August 1879
Death Date: 02 April 1950
Performances: 1900, Leipzig
1907, London
1921, Munich

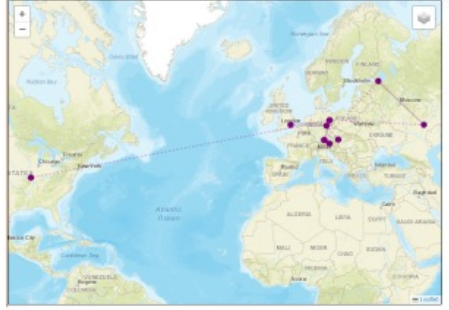

Studies and Employment

Studies Music at Leipzig Conservatory 1899-1904
Private Lessons at home 1884-1886
Studied with Theodor Leschetizky 1894-1898

Residences


Born in Vienna 1879-1899
Lived in Vienna 1886-1893
Settled in Berlin 1904-1909
Resided in St. Petersburg 1909-1912
Moved to Planegg 1912-1915
Resided in Munich 1919-1921
Lived in Berlin 1921-1926
Moved to St. Louis 1927-1950

Musical Maps Data Entity
VIAF authority file




[View events on a map ➔](#)


Documents



[Concert Cycles 1907](#)



[Concert Program 1919](#)



[Excerpts from the Boyhood...](#)

Related People

- Theodor Leschetizky
- Franz Liszt
- Ferruccio Busoni
- Carl Reinecke

[View all Connections...](#)

Figure 12: Displays mock-up created by Patrick Cuba and Bryan Haberberger in collaboration with M. Nathalie Hristov and Kathryn Shepas to represent a person record, Gottfried Galston. This mock-up shows events with documents of evidence. Additionally, the image shows related people and connections that Gottfried Galston has based on the data entered.

Principles for the Development of Musical Maps

Meaningful output

- Events entered show dates, location on a map, and picture of location.
- Other events that occurred at this location will populate with the date.
- Connections between musical persons will be visible to explore further.

MUSICAL MAP

University of Tennessee-Knoxville

[View Collections](#) [People](#)

Studied at Vienna Conservatory

At the Leipzig Conservatory, Galston studied theory, counterpoint, and composition with Carl Reinecke and piano and composition with Salomon Jadassohn (d. 1902).

1899-1904

Vienna, Austria ([geonames](#))



[Leipzig Conservatory \(wikipedia\)](#)

[View interactive map](#)
[4 connected timelines](#)
[33 nearby events](#)

At this Location

1860 Carl Reinecke teaches piano at Vienna Conservatory
1870 Wilhelm Mayer begins post at Vienna Conservatory
1875 Ferruccio Busoni enters Vienna Conservatory

1899 **Gottfried Galston enters Vienna Conservatory**

Explore Connections



I, Appaloosa, CC BY-SA 3.0 <<http://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons

Figure 13: Displays mock-up created by Patrick Cuba and Bryan Haberberger in collaboration with M. Nathalie Hristov and Kathryn Shepas to represent an event entry and the future of what the musical map platform will show as a meaningful output.

Principles for the Development of Musical Maps

Meaningful output

- Visualizations must accurately represent the migration of a musical person, place, or thing over time and space.
- Moveable timeline to expand or narrow results based on year.
- Option to click on one or more people to see the intersections.

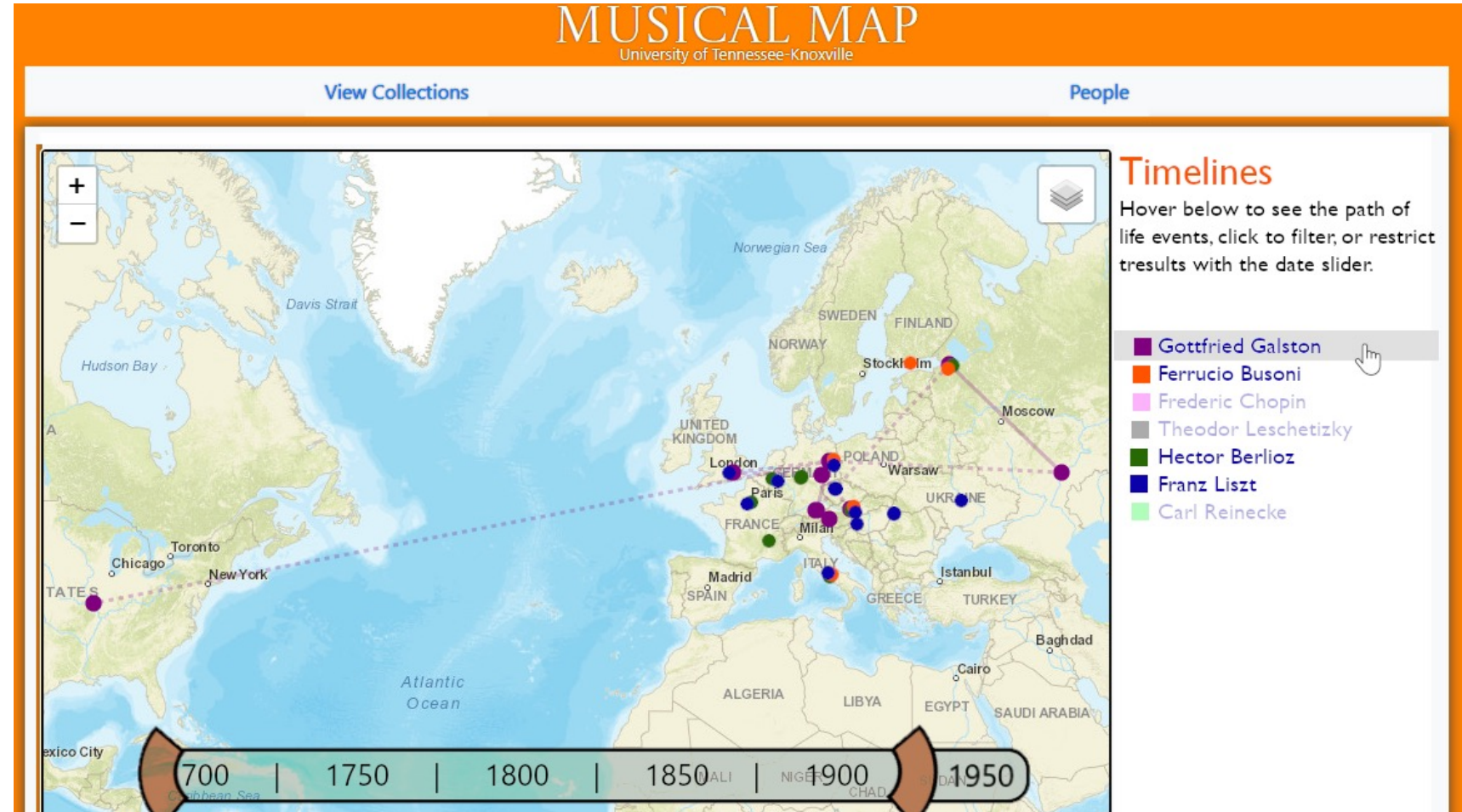


Figure 14: Displays mock-up created by Patrick Cuba and Bryan Haberberger in collaboration with M. Nathalie Hristov and Kathryn Shepas to represent the interactive musical map including the timeline function at the bottom of the screen to expand or narrow results based on year and an option to choose a timeline of people. Things and places will be included in future iterations of the musical map.

Outcomes for the Development of Musical Maps



A reliable source for scholarly research and the study of music and musicians throughout time and space.



Librarian oversight to ensure the integrity and authority of the data, as well as the precision and recall of queries.



Visual output generated from user queries is optimized to meet the learning style of contemporary and future students and scholars.



Connections between musical entities are more easily discerned through computer generated comparisons.

Challenges & Next Steps

- Funding – currently, public funding and grants are preferred over private funding to avoid access restrictions.
- International cooperation and coordination of effort – participation by librarians across the globe with access to primary sources is essentially in expanding the scope of this project.

Next Steps:

- Apply for grant funding with support from the University of Tennessee and other collaborators.
- Reach out to librarians from selected institutions to request data entry from primary sources for specific musicians and/or musical entities.

Appendix: Dictionary of Content Designators - Digital Music Map

Events	People (Library of Congress Name Authority Records)	Places (Musical Landmarks: GeoNames)	Things [Populated from LOC Authority Files (e.g., name-title authority records, topical subject headings, etc)].
<ul style="list-style-type: none">• Birth• Death• Studied In/Educated In• Taught At• Performed In• Worked at (non-teaching or performance)• Resided In• Composed• Created• Arranged• Modified• Edited• Established• Ceased• Reestablished• Visited• Renamed (GeoNames data)	<ul style="list-style-type: none">• Composer• Arranger• Performer• Instrumentalist (name of instrument)• Vocalist (name of range)• Conductor• Performance Ensemble• Theorist• Historian• Pedagogues• Musical collaborator (lyricist)• Musical collaborator (other)• Instrument maker	<ul style="list-style-type: none">• Performance venue• Residence<ul style="list-style-type: none">• Ex. Home• Ex. Where a composer wrote a specific piece• Music education facility• Place of musical subject<ul style="list-style-type: none">• Ex. Moldau River	<ul style="list-style-type: none">• Musical event (ceremony)• Musical work• Musical event (performance series, festival)• Musical event (performance series, competition)• Musical event (performance series, general)<ul style="list-style-type: none">• Ex. Includes chamber music series or any type of concert performance or series• Instrument(s)• Instrument family• Ensemble type• Sonorities: scale / modal systems• Notational systems• Meters/Rhythmic patterns• Styles/genres<ul style="list-style-type: none">• Ex. Expressionist period

Appendix: Dictionary of Content Designators - Digital Music Map

People	Using Library of Congress Name Authority Records, the facet <i>people</i> will be described using designators below.
Primary Occupation	Used to describe a person's primary occupational contributions using the following controlled terms: composer, arranger, instrumentalist (instrument name), vocalist (soprano, mezzo-soprano, contralto, countertenor, tenor, baritone, bass-baritone, bass), conductor, performance ensemble, theorist, historian, pedagogue, musical collaborator, instrument maker. It is an option to select multiple primary occupations.
Secondary Occupation	Used to describe a person's secondary occupational contributions using the following controlled terms that are the same as the ones above listed in primary occupation. A secondary occupation is determined by an occupational contribution that does not reach the same magnitude of output as the primary occupation. It is an option to select multiple secondary occupations.
Studied under	Used to link and list teachers to the people record using library of congress name authority record. This field is repeatable.
Teacher of	Used to link the people to a list of students that studied under the teacher using Library of Congress Name Authority Records. This category may not always be used. The field is repeatable.
Collaborated with	Used to add people records and link collaborations and connections using Library of Congress Name Authority Records. This field is repeatable.

Appendix: Dictionary of Content Designators - Digital Music Map

Places (Musical Landmarks)	Using GeoNames, the facet <i>places</i> will be described using designators below.
Performance venue	Used to describe a musical landmark that acts as a performance venue (example: Deutsches Nationaltheater and Staatskapelle Weimar).
Residence	Used to describe a residence such as a person's home, where a composer wrote a certain composition, etc.
Music education facility	Used to describe places that act as music education facilities such as where people have studied (example: Paris Conservatoire).
Place of musical subject	Used to describe a place inspired by a musical work or musical idea (example: Moldau River).
Things	Populated from LOC Authority Files (e.g., name-title authority records, topical subject headings, etc.)
Musical work	Used to input a musical work with a LOC authority file.
Musical event	Used to describe a musical event including the following designators: ceremony, festival, competition, concert, recital, musical series, performance general. (includes chamber music series and any type of performance series.

Appendix: Dictionary of Content Designators - Digital Music Map

Things (continued)	Populated from LOC Authority Files (e.g., name-title authority records, topical subject headings, etc.)
Instrument(s)	Used to name instruments: piano (including forte-piano, organ, clavichord, harpsichord, violin, viola, cello, double bass, viola da gamba, mandolin, guitar, lute, harp, french horn, bassoon, contrabassoon, clarinet (includes soprano, basset horn, alto, A-flat, E-flat), flute, bass flute, piccolo, saxophone (includes soprano, alto, tenor) trumpet, trombone, tuba, euphonium, percussion (variety of percussive instruments).
Instrument family	Used to describe instrument families using categories: keyboard instruments, strings, woodwinds, and brass.
Ensemble type	Used to describe ensemble (example: piano trio, quartet, quintet, etc.).
Sonorities: scale / modal systems	Used to describe scales and modal systems that occur in time and space (example: dorian mode or pentatonic scale).
Notational systems	Used to describe
Meters/Rhythmic patterns	Used to describe variety of meters and rhythmic patterns found in musical notation.
Styles/genres	Used to describe a style or genre that exists for a composition (example: expressionist period).

Appendix: Dictionary of Content Designators - Digital Music Map

Events	Designators below are used to populate events that occur for the facets people, places, and things.
Birth	Used for entering known birthplace and known birth date, month, year. If full date isn't known, you may enter what information is known.
Death	Used for entering known death place and known death date, month, year. If full date isn't known, you may enter what information is known.
Studied in / Educated in	Used for entering the place or music education facility that a person studied in and known date, month, year. If full date isn't known, you may enter what information is known.
Taught at	Used for entering the institution or music education facility that a person taught at. Known date, month, year will be entered. If full date isn't known, you may enter what date information is known.
Performed in	Used for adding a performance venue where a person appeared. If date is known, you may add what information is known for the date.
Worked at (non-teaching or performance)	Used to add life event for a location worked at that is not a music education facility or performance venue (example: music critic for newspaper or journal).
Resided in	Used to add a location of residence with GeoNames location.

Appendix: Dictionary of Content Designators - Digital Music Map

Events (continued)	Designators below are used to populate events that occur for the facets people, places, and things.
Composed	Used to represent a life event such as publication or completed composition.
Created	Used to represent a thing and life event of a created work such as a production.
Arranged	Used to represent a thing and life event of an arrangement of a compositional work.
Modified	Used to represent a life event where a composition or work may have been modified.
Edited	Used to represent a life event where a work may have been edited.
Established	Used to represent a life event where a musical landmark or ensemble may have been established.
Ceased	Used to demonstrate the disestablishment of a musical landmark or ensemble.

Appendix: Dictionary of Content Designators - Digital Music Map

Events (continued)	Designators below are used to populate events that occur for the facets people, places, and things.
Reestablished	Used as a life event to represent a reestablished performance venue, performance ensemble, etc.
Visited	Used as a life event to represent a visit or appearance of a performance venue, concert, musical landmark, geographical landmark, etc.
Renamed (GeoNames data)	Used as a life event for the renaming of a performance venue, place, landmark, or ensemble, or potentially a work.

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