The Roles of Academic Libraries in Shaping Music Publishing in the Digital Age

Kimmy Szeto

Abstract

Libraries are positioned at the nexus of creative production, music publishing, performance, and research. The academic library community has the potential to play an influential leadership role in shaping the music publishing life cycle, making scores more readily discoverable and accessible, and establishing itself as a force that empowers a wide range of creativity and scholarship. Yet the music publishing industry has been slow to capitalize on the digital market, and academic libraries have been slow to integrate electronic music scores into their collections. In this paper, I will discuss the historical, technical, and human factors that have contributed to this moment, and the critical next steps the academic library community can take in response to the booming digital music publishing market to make a lasting impact through setting technological standards and best practices, developing education in these technologies and related intellectual property issues, and becoming an active partner in digital music publishing and in innovative research and creative possibilities.

Introduction

Academic libraries have been slow to integrate electronic music scores into their collections even though electronic resources are considered integral to library services. The Association of College and Research Libraries considers electronic resources integral to information literacy, access to research, and collection policies in academic libraries (ACRL 2006a, 2006b). Collection development surveys conducted by the National Center for Educational Statistics indicate electronic books, database subscriptions, and electronic reference materials constitute roughly half the materials

LIBRARY TRENDS, Vol. 67, No. 2, 2018 ("The Role and Impact of Commercial and Noncommercial Publishers in Scholarly Publishing on Academic Libraries," edited by Lewis G. Liu), pp. 303–18.

budget in academic libraries in the United States (2012). While librarians continue to examine the impact of electronic books and databases (Lamagna, Hartman-Caverly, and Swenson Danowitz 2015; Walters 2013; Walters 2014; Durant and Horava 2015), literature on electronic musical scores has been more scarce, reflecting the format's state of integration into library collections. With electronic sheet music publishing on the rise (McGinley 2016b), libraries are positioned at the nexus of creative production, publishing, performance, and research. In this paper, I will discuss the factors that have contributed to this moment, and the critical next steps the academic library community can take to become an influential player, together with music publishers, in the electronic scores ecosystem.

Electronic Scores in Libraries

Library offerings of electronic scores are generally offered in the same way as electronic books or online databases even though the nature of the demands and uses for music scores differs significantly. Ana Dubnjakovic (2009) described the recent proliferation of digitized sheet music online and offered advice on evaluating the quality of the sources and effective searching. Lisa Hooper (2013) issued a call-to-action to initiate a "dialogue between music librarians, vendors, publishers, acquisition librarians, and other non-music librarian professionals" (575). Yet libraries have continued to be reactive to the evolving publishing landscape and complementary technologies. In his 2015 speech, when comparing electronic scores to digital text and the burgeoning field of digital humanities, Darwin Scott declared the state of electronic score "fractured, stuck in nascent and divergent stages of development." He described libraries as meeting the electronic score format in a relationship that is "murky and sometimes stormy," and the effort to integrate it into library operations as "bumpy," resulting in "collective frustration" and "passive surrender." Scott's sentiment was echoed in Hooper's presentation (2015) where she called for positive action and advocacy, with a focus on influencing publishers and vendors on pricing models, licensing models, user interface, and cataloging.

Since then, the music library community has responded with several technical responses. Acknowledging the prevalence and importance of self-publishing, Kent Underwood produced a landmark study of contemporary composers self-publishing works online (2016), and established an archival process for these composers' websites with curator Robin Preiss (Underwood and Preiss, n.d.). Reed David and Nurhak Tuncer (2016, 2017) found significant music publishing activities occur online in their survey of bibliographic cataloging practices of self-published items. They discovered that most bibliographic records of this type originated from academic libraries, which suggests that academic libraries represent the site of significant collecting activity. Meanwhile, Adams and Levy (2017) questioned the nature of publishing itself by way of focusing their study on the bibliographic cataloging of print-on-demand scores in physical format. They recognized that digital engraving and printing technologies have given rise to a print-on-demand industry, which blurs the distinct cataloging concepts of publication, distribution, and printing. Such blurring and merging of publishing processes will put academic libraries in a unique position to influence the entire life cycle. Behind the issues of cataloging is the peculiar collection practice where scores are acquired in the electronic format but then the library prints, binds, and circulates them as physical copies, as discussed in Peters (2017).

State of Electronic Scores

Attempting to define the term "electronic score" or "digital score" is a fraught enterprise. The perils stem from the wide applicability of the concept "music score," and the divergent, nonunified situation of its electronic format. In particular, the influence of electronic books, which are not analogous to electronic scores, may hinder emergent best practices, in that applying the considerations for one to the other will make it more difficult for libraries to integrate electronic scores as a collection category.

On the surface, the digital image makes a serviceable electronic counterpart to the physical page. However, such an image is a static, final form document, an image, which, from the perspective of a computer, is no different from any other graphic or digital photo, containing no actionable data other than pixels of color. Today, with digital text, one can reasonably expect to be able to perform some dynamic functions on the text, such as searching, highlighting, adaptive display, reading aloud, and in certain circumstances, light editing. These functions are made possible by the presence of the textual content embedded in a digital text underlay, where each letter and punctuation is as if "typed up" and linked to its corresponding location on the image. This machine-actionable layer can be created natively from the start when a document originates from a word processor, which subsequently generates the image. Or, the digital image can be created first, such as by scanning, and then the computer "reads" the image through optical character recognition (OCR) software, which generates the digital text underlay. This image-cum-text package is commonly distributed via the Portable Document Format (PDF), popularized by the Acrobat software, which serves primarily as the OCR software and screen reader.

Electronic scores have also been produced and distributed widely via PDF. However, the distribution of music notational content is complicated by a few factors. First, no dominant, open standard has yet to emerge to support the encoding of the variety of musical notation systems and fonts. As a result, the widely and freely available PDF infrastructure remains the de facto standard for the music score, but is capable of providing viewing only, without any dynamic functions. Second, improving the quality of optical music recognition (OMR), encoding music notation through reading digital images of printed music, continues to be a technological challenge (Rebelo et al. 2012). Third, the visual formatting of music notation for printing or screen display, called engraving, is so complex that computers are only beginning to be able to produce satisfactory layouts comparable to those created by hand.

Advances in computing power and machine learning are enabling great strides in OMR and digital engraving. The emergence of open standards such as MEI, MusicXML, and SMuFL have empowered digital scholarship and facilitated the exchange of music notation files across music writers. As a result, the creation and distribution of natively created digital scores as well as score reader software that offers dynamic functions has increased.

Music Publishing

Music Publishing

Music publishing distinguishes itself from general publishing as a subset that specializes in issuing products that consist primarily of musical notation (Krummel 2001). George Sturm (2000) characterized music publishing as "the *art* of bringing a *musical product* to a *public*" (628; emphasis in original, underlining added). This statement warrants unpacking. First, even though the artistic work is communicated through sound, the product exists, traditionally, in the form of a score, and producing a musical score is itself undeniably an art. Second, the intended audience of this product is not *the* general public, but rather, *a* certain public, a narrower demographic of users and collectors who tend to have specific needs. Finally, music publishers have various ways in which to *bring* out their products.

For libraries, it is important to understand certain idiosyncratic behaviors of music publishers. The traditional roles of music publishers are as follows: commissioning, financing the production, promoting the publications, and distributing the product. Publishers serve as the mediator between supply and demand: they seek out promising composers and songwriters and find or create a market for their works. In so doing, a publisher may purposely withhold a score at any of the following stages: production, publication, distribution, reproduction. Krummel (2001) put these behaviors into three categories: produced but not published, such as luxury editions privately commissioned by a collector; printed but not published, when the composer wants to directly negotiate royalties and control the performances; published but not printed or distributed, when manuscripts and handwritten copies sufficed or are preferred.

This last category presents a particular complication. Manuscript scores are preferred when the score is expected to undergo frequent changes, such as in an operatic score, and when the composer intends to depict ideas beyond the capabilities of standard notation and engraving. The tradition of copying scores (by hand) is so ingrained in music publishing that the manuscript score still occupies a good portion of publications, and the notational contents in these scores are the most technologically challenging to transfer to digital form.

Music Printing

The history of music publishing is interwoven with the history of technology, society, and commerce. Musical notation has been used for memory aid for millennia, and, in the past three hundred years or so, became a separate artifact of a musical "work" apart from the act of performing the music. Producing musical notation is difficult. Writing out the notation requires a deep knowledge of the musical content, as well as discipline and precision to the spacing and graphic details of the symbols. Printing techniques using woodblocks, stones (lithography), and metal plates (intaglio) require not only music literacy and penmanship but also craftsmanship to produce the reverse negative and ink the medium. Also, these mediums are not reusable. Movable, reusable type presents printers with a different dilemma: invest in a very large amount of type to account for every possible overlapping of musical elements and print with a single impression, or run the same sheet of paper through multiple impressions of separate musical elements but risk misalignment and waste of paper and ink. Eventually, photographic methods rendered the dilemma moot, and photoengraving on stone, copper, and zinc plates became the dominant method.

The liberation of printing from the limitation of printable symbols encouraged composers to experiment beyond conventional standard notation. However, music publishers producing scores by computer run up against the same constraints as they did prior to the development of the photoengraving method, as score writers are limited to symbols available in the font and the engraving capability of the software.

Music Publishing for Academic Purposes

Until the mid-nineteenth century, consumers of music scores were primarily performers. Accordingly, music used to be sold in music shops together with music supplies, rather than in book shops. The business changed when public concerts and music literacy became more widespread. This period also saw the rise of the academic study of music performance and musicology, which led to the demand and production of facsimile editions of manuscripts, sometimes with their corresponding standard notation counterpart, and reproductions of early editions of published music. Public concerts and sound recordings also increased interest in the general public for study scores, which are printed in a smaller size, often accompanied by commentaries, analytic essays, and corrections to the original score.

In addition, academic libraries also tend to collect the following types of scores: performance editions, which are laid out in a larger size with convenient page turns, often with commentaries and performance guidance; scholarly editions, which are edited to reflect the historical and bibliographical study of the provenance and transmission of works; and complete editions, which represent all the output of a particular composer. The impulse to anthologize is particularly strong in the United States due to a period of active reprinting of repertoire lost in Europe to the Second World War. However, because many of the original plates are lost, such republication efforts were often accomplished by photographic or photolithographic reproductions from earlier printed copies, with varying results.

Sheet Music Publishing

Generally speaking, the classical repertoire is continually being copied and re-engraved digitally, and new compositions are being created digitally. However, libraries continue to collect physical editions, and consumers, even when purchasing online, continue to find music publishers offering only static digital images of physical editions. Meanwhile, the sheet music publishing industry overall has been steadily declining, and has been slow to capitalize on the growing digital market.

Industry reports on the ten-year period beginning in 2006 in the United States show that sheet music publishing overall (print and digital) experienced a 40% decline (McGinley 2016b), while book publishing industry revenue decreased 17% in print (Rivera 2017), but was accompanied by an one hundred-fold increase in the digital market (McGinley 2016a). The analyst who reported on the sheet music industry attributed the current decline to dwindling demand due to declining music education, literacy, and piracy, but maintained a positive five-year outlook comparable to electronic book publishing due to growth in the digital market.[1] At present, for the sheet music industry, digital publishing is akin to selling the same products, while eliminating the costs for printing and distribution, as well as for the metal plating and lithographic engraving process.

It is true that music publishers have begun selling scores electronically. More precisely, music publishers have adopted the business model to sell licenses to digital copies of static electronic scores. The licensing model affords music publishers the ability to sell their products in smaller units and maintain more control through placing restrictions on usage, such as the time period in which the score is accessible and the number of times the score can be printed or circulated. These restrictions are accomplished through allowing access via subscriptions and via proprietary software. The end result for the consumer is essentially the same as purchasing print, that is, to obtain a digital substitute for the print, without most of capabilities of the digital medium.[2]

Music publishers have just begun to take advantage of the potential dynamic functions of the digital medium. The reasons are not solely due to lowering cost and increasing revenue. The shadow of electronic books, technological constraints, and user behaviors all contribute to the delayed electronic boom.

Technology of Electronic Scores

Encoding of Music Notation

Encoding text is relatively simple because text is a one-dimensional sequence of letters. Music notation, on the other hand, involves capturing multiple streams of symbols that vary in length and size and interact with symbols in other streams in different ways depending on context. Encoding music notation into structured machine-readable and machine-actionable data is even more complex, since the notation's context dependency cannot be translated to simple rules.

This complexity is especially true for engraving, where, over three decades of development, software is still unable to achieve the level of visual clarity expected from hand-engraved scores. The challenge with the encoding is, therefore, to balance the amount of notational data that needs to be encoded, the complexity of the rendering or analytical engine, the computing power required, and the amount of human intervention that is expected. This challenge has contributed to the high cost of music notation software relative to text, and the long period of development before the technology becomes widely affordable.

Encoding Standards

There have been many players in the development of structural representation of music notation. Early development for standard western notation has been dominated by two commercial score writers: Finale (first released in 1988) and Sibelius (first released in 1996). Both software programs focused on the graphical production environment: replacing the manual music notation input and engraving, and generating printed scores and static PDF. The proprietary nature of these two software programs kept the cost high and prevented development of compatible score readers that offered dynamic functions. Meanwhile, open-source developments progressed at a slower pace. The open-source software LilyPond was first released in 1998, but this text-based, engraving-focused engine has not enjoyed widespread use. The Humdrum format has long been used for music analysis since the 1980s, but its software tools were purposely not developed to include engraving or printing (Huron 2001).

In recent years, open standards, especially MEI and MusicXML, have matured enough to compete with the two proprietary standards. The Music Encoding Initiative (MEI) began as a joint project of the University of Virginia Library and Der Akademie der Wissenschaften und Literatur in Mainz, and has now turned into a community-driven collaboration. MEI is geared toward scholarly publishing of historical repertoire, including encoding of musical notation from the Medieval and Renaissance periods, as well as music-analytical, historical, and bibliographic information (Hankinson, Roland, and Fujinaga 2011).

MEI compares itself to MusicXML as the format that focuses on capturing intellectual content in an existing physical musical document, while MusicXML is designed to mediate between commercial score writers (MEI 2018). First released in 2004, MusicXML, originating from a software company, was developed to facilitate exchange of files between Finale and Sibelius (initially via plugins, although now conversion is supported natively in both software). In 2015, development was transferred to the W3C Community Group, an open web platform currently dominated by software companies and music publishers (see the list of persons and institutions who have committed to the Final Specification Agreement in Music Notation Community Group 2017). In the same year, the open-source score writer MuseScore, which supports MusicXML, released a major version update that offers functionalities comparable to those offered by the other commercial software. Currently, work is in development to better integrate MusicXML to the open music notation font platform SMuFL (Good 2017).

Encoding tablature and chord notations is relatively simpler, and the situation is less fraught. The widely used commercial proprietary format and editing software Guitar Pro is well documented (Vromman, n.d.) and has been adopted by other software programs. Free, open-source alternatives such as PowerTab and ChordPro provide similar functionalities. These three formats are found being implemented on websites, such as Ultimate Guitar and Chordie, to perform dynamic display and transpositions, which offer a glimpse of dynamic functions possible in electronic scores.

The convergence of open encoding standards and software has spurred the production and use of electronic scores. The earlier focus on developing the production environment is now shifting to the user side, especially since tablet devices have become more affordable. With open standards, electronic score readers have proliferated and are gradually adding dynamic functions to music scores. These score viewers are annotation tools for PDF files geared toward music scores, and are capable of manipulating encoded music scores, such as on-the-fly re-engraving in response to screen size and user resizing, and interactive functions such as selective display, selective playback, transposition, search and highlight, and user annotation (Winget 2008). In addition, score readers now commonly have the ability to communicate with other devices for exchanging files, page turning with external pedals, and synchronized controls, as well as interfacing with online storage (Szeto 2018). However, this technology stack is not necessarily standard in library services or in a music information literacy curriculum.

Users of Electronic Scores

Use of Music Scores

Music notation serves a dual ontology: to depict musical ideas, which, in turn instruct the performance of the sounds. From the user perspective, there is a large difference between reading a book and reading a music score, which often necessitates more extensive scrutiny of the notation and examination of multiple publications of the same work.

In realizing pitch, duration, and sometimes words, the process is meant to be carried out continuously in time, and, in works with more than one part, to be synchronized across multiple performers. Depending on circumstance, users may seek the score, which presents all the parts in a single view, or the part, which presents only a single performer's view. In vocal music, a user might be interested in seeing the score written in a transposition, that is, essentially the same piece of music in a different key or at a different overall pitch level. In print, scores, parts, and transpositions are all published as separate items. Library cataloging practices traditionally address these issues at the FRBR expression level. Rules for distinguishing scores from parts have long been in place, but musical key has not been a consistent element of description until recently, an omission from the catalog that has historically presented difficulties for library users.

Users also seek multiple editions for their physical layout and accompanying contents. Music scores, especially performance editions, are meant to be read by performers some distance away from the score so that individual preference for the font and size of notation, spacing, and pagination factors strongly. Users also seek to compare editorial annotations—instructions, guidance, suggestions, and translations added to the musical notation—which are useful for realizing the score as well as for historical performance study (R. Scott 2013).

Lastly, the reading of a music score requires extensive personal interaction, which is a contributing factor to the "music score's slow entrée into the digital realm," as Hooper (2015) describes:

> We analyze it, we write in our own fingerings, we change bowings, we add other visual cues, and all of this we write directly into the score. We do this because looking at a musical score is rarely a one-off occurrence. We read and reread a score from start to finish a thousand times, dissect it into the tiniest fragments until the music is ingrained in our mind, in our fingers, and, I am sure some would say, in our souls. In short, a student musician's typical interaction with a score is far more active than a student's typical interaction with a book. (571)

Characteristics of Electronic Scores

In fact, the particular nature of use of music scores actually lends itself very well to the digital form. Dynamic electronic scores can provide the following:

- Portability:
  - can be accessed anywhere without having to obtain and carry multiple editions
  - can be displayed on any device
- Legibility:
  - can adapt to different screen sizes
  - can adjust the display size (font size)
  - can accommodate legible and musically sensible annotation and highlights
- Manipulability of musical content:
  - can be displayed or played back in transpositions
  - can be played back with custom instrumentation
  - can be displayed or played back selectively
  - can be played back at custom speeds
  - can be searched and evaluated quantitatively

Music publishers are beginning to see the demands for these dynamic functions and are now beginning to offer services that include display, playback, and transposition options in mobile applications.

Electronic Scores on Cloud Platforms

Cloud applications have made possible a single destination for creation, display, and interaction of scores. In this computing model, contents and functionalities are accessed online and are selectively served to users based on permissions, thus eliminating the need for separate, locally installed score writer and score reader applications. When a user creates a score using a cloud application, the score is automatically stored in the cloud. The creator can then grant permissions to other users so that they can access certain dynamic functions offered by the application.

Music publishers and software developers alike are now migrating to the cloud platform. Noteflight, initially developed by textbook publisher W.W. Norton as an online interactive music theory workbook, has evolved into a general music notation tool with emphasis on the education market. Sibelius followed with the service Sibelius Cloud Publishing, which is aimed toward composers and arrangers for creating, publishing, and marketing their works. Meanwhile, the music publisher and distributor Hal Leonard acquired Noteflight (in 2014) and the online retailer Sheet Music Plus (in 2017) to create a cloud platform for selling and licensing existing works.

All these transformations might be transparent to the average user, who will see their production environment and retail experience largely unchanged. However, this technological leap will revolutionize the music publishing industry because the platform liberates electronic scores from PDF to exploit the dynamic functions, and at the same time erases the boundary between production, publishing, and consumption.

Academic Libraries in Electronic Score Publishing

Academic Support

Academic libraries' involvement in this electronic score revolution has been limited largely to MEI, which has demonstrated libraries' unique position to breathe new life to old music, especially the medieval and Renaissance corpora, which are getting much attention since computational and empirical music research becomes possible. Structured encoding such as MEI, MusicXML, and Humdrum, together with programming tools like Python and music21, enable searching musical elements and notational symbols within musical works. Much like full-text searching in digital humanities applications, the ability not only gives library users the ability to search beyond catalog descriptions, it can also enable novel analytical methodologies that generate new musicological insights and perspectives (see Fujinaga, Hankinson, and Cumming 2014). A cursory search on how computers have played a role in music scholarship quickly returned a wealth of recent research that has uncovered new voice-leading principles through computer analysis of fifteenth- and sixteenth-century music theory treatises (Morgan 2016); furthered the application of neural networks to analyzing musical structures (De Valk 2015) and orthography, which improves OMR (Cherla 2017); spurred the development of music informatics (Steyn 2013) and big music data infrastructure (Fournier-S'niehotta, Rigaux, and Travers 2016; Abdallah et al. 2017); facilitated new digital methods of cultural studies (Serra 2017); and advanced human-computer interactive performances (Delgado, Fajardo, and Molina-Solana 2011; Kirke and Miranda 2013).

Beyond collecting and guiding users to online collections of electronic scores, libraries can play a systematic, strategically active role in the development of the electronic score infrastructure and integrating related services. Many academic libraries already support electronic text by providing scanners, content management, and software tools. Supporting electronic scores is very similar, perhaps with the addition of circulating tablets and page-turning peripherals. With vertically integrated services in place, the library is essentially also supplying the necessary technology for electronic score publishing, as well as a means for bibliographers to develop and maintain collections of electronic scores.

Libraries can even go one step further, perhaps consortially, to establish digital library platforms for music research (for example, as demonstrated in Arora 2011), and build the corpus by encoding their own score holdings, especially the vast repertoire of music in the public domain. In fact, libraries can take the lead role in educational policy—should this technology stack become a standard library service—to institute the technological component in the information literacy curriculum for music students, just as online research and word processor skills are in a general curriculum.

Another leading role libraries can play involves the proper management of intellectual property when offering electronic score publishing to library users. Copyright issues have historically been a complex issue in music publishing (Meek 1953) and encompass various types of rights (moral, literary, performance, mechanical, and grand). The applicability and nonapplicability of the fair use doctrine and the first sale doctrine add complexity to licensing and ownership. Libraries, possibly bringing together expertise from an institution's legal department, can tackle these issues on several fronts. They can educate library users on what can lawfully and unlawfully be done with an electronic score. They can educate composers and arrangers on the circumstances under which copyrighted music can be reused and incorporated in their own works, as well as how to protect their own copyright as they publish their works. These efforts will involve participating in developing new standard licenses; interacting with collective rights management, such as with performance rights organizations; and, more generally, educating library users to think more critically about the economic, social, cultural, and legal ramifications of their intellectual rights, since now libraries are providing support as a publishing platform (Brown and Waelde 2018).

Technical Support

Libraries, especially academic libraries, interface between a population of heavy music users, creators of sheet music, public domain sheet music contributors, and music publishers. This is a unique position from which to lead the publishing industry and to standardize and simplify electronic scores. The result, ultimately, will shape the entire ecosystem so that electronic scores flow more smoothly and become more useful.

Historically, libraries have already proved to be influential in setting technical standards for information systems. As the commercial publishing market begins to converge on the open standard MusicXML, libraries really ought to reach out and weigh in. A music encoding standard that works well together with emerging bibliographic standards such as Bibliographic Framework Initiative and Performed Music Ontology will be the key to integrating electronic scores workflow through the entire life cycle of music scores.

Standardizing the production chain goes beyond standardizing encoding—it also includes engraving specifications, embedded metadata, and embedded rights management, all of which will facilitate music distribution for creators. On the user side, libraries can then use these technical production standards as a basis for discovery system requirements. Compared to the current requirements, which are based on descriptive metadata (Newcomer et al. 2013; Music Discovery Requirements Update Task Force 2017), the inclusion of semantic, rights, and other types of embedded metadata can make searching and automated processes much more powerful.

Creative Support

On the creative side, academic libraries can become centers or major supporters of research in composition and performance. In real-time notation, also variably called live notation, dynamic notation, live coding, live scoring, virtual scoring, and reactive notation, the "score" of this performance art is continually created and transformed as a response to the very performance itself as it takes place (Clay and Freeman 2010). These "scores" can even be networked so that each ensemble musician is served an individually tailored part on their mobile device in real time (Eldridge, Hughes, and Kiefer 2016; Onttonen 2017). Another type of performance art, "augmented musical scores," connects data streams—video, audio and motion sensors, the performers' sounds and biomechanical movements—turning live transactions of all kinds into a multimedia, human-computer performance (Tanaka 2000; Hope 2017). Other creative areas that can take advantage of electronic scores involve audience-assisted composition (Freeman 2008) and computer-assisted composition, where music notation intersects with computer programming in a composition environment such as OpenMusic (Agon 1998; Agon, Assayag, and Bresson 2018).

Conclusion

Academic libraries thus have the potential to become the force that empowers a wide range of creativity and scholarship: music performance, musicology, typography, cultural studies, performance studies, and human-computer interaction. In the publishing marketplace, academic libraries can play a leading role in shaping the industry life cycle so that new products are more readily discoverable and accessible, which will ultimately benefit music publishers as well as creators and consumers. Academic libraries are poised to take the lead and make a lasting impact on setting technological standards and best practices, developing education in these technologies and related intellectual property issues, and becoming an active partner in innovative creative possibilities.

Notes

1. Print book industry revenue declined from $32.2 billion in 2006 to $26.67 billion in 2016, with a five-year outlook of 2.2% annualized growth (Rivera 2017); electronic book industry revenue grew from under $35 million in 2006 to $3.8 billion in 2016, with a five-year outlook of 1.3% annualized growth (McGinley 2016a); sheet music industry revenue declined

from $457.7 million in 2006 to $268.5 million in 2016, with a five-year outlook of 1.1% annualized growth (McGinley 2016b). These figures reflect only the sales of publications, excluding revenue from various forms of licensing and royalties (see calculation by analyst Will Page in Ingham 2016).

2. From the FAQs on three major online sheet music retailers—musicnotes.com, onlinesheetmusic.com and sheetmusicplus.com—all allow one transposition and one print per purchase and unlimited viewing. The first two sites use a proprietary viewer, while the third places printing restrictions within the PDF file.

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Kimmy Szeto is an assistant professor and metadata librarian at Baruch College, City University of New York, where he oversees metadata management for digital resources. His recent research on the technical and conceptual tensions between cataloging practice and the linked data environment plays a pivotal role in shaping the modeling of linked data standards in the library community. He is an active presenter at the Music Library Association and the International Association of Music Libraries, and has published in *Notes*, the *Journal of Web Librarianship*, the *Journal of Electronic Resources Librarianship*, and the *Encyclopedia of Information Science and Technology*. Outside the library and academia, Kimmy can be heard as a chamber arranger of symphonic works and as a collaborative pianist in concert halls and theaters around New York City.