Transformation through Integration: The Renaissance Knowledge Network (ReKN) and a Next Wave of Scholarly Publication

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Abstract

This article reflects on the first six months of funded research by the Renaissance Knowledge Network (ReKN), focusing especially on the possibilities for interoperability and metadata aggregation of diverse digital projects, including but not limited to Early English Books Online—Text Creation Partnership; the Iter Bibliography; the Canadian Writing Research Collaboratory; the Advanced Research Consortium network; Editing Modernism in Canada; the INKE working groups; and several other, smaller projects. This article also considers how internetworked resources and a holistic scholarly environment should incorporate and build on existing publication and markup tools. Key to this process of facilitating new forms of scholarly production are including possibilities for middle-state publication; exporting both primary and critical content; and forming new types of technologically facilitated scholarly communities.

Keywords

Digital humanities; Renaissance; Aggregation; Metadata; Digital publication

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Introduction

As presented at the Implementing New Knowledge Environments gatherings in New York (September 2013), Whistler, BC (February 2014), and Sydney, NSW (December 2014) (see Powell & Siemens, 2013; Powell, Siemens, & Bowen, with Hiebert & Seatter, 2014), the Renaissance Knowledge Network (ReKN) is a major scholarly initiative designed to augment digital scholarship in early modern studies by developing an integrated research, analysis, and publication environment. ReKN focuses in particular on the possibilities for interoperability and metadata aggregation of diverse digital humanities projects, including but not limited to Early English Books Online—Text Creation Partnership (EEBO – TCP); the Iter Bibliography; the Canadian Writing Research Collaboratory (CWRC); the Advanced Research Consortium (ARC, with constituent nodes); Editing Modernism in Canada (EMIC); the INKE working groups; and several other, smaller projects. Based at the University of Victoria's Electronic Textual Cultures Lab and in partnership with the Toronto-based Iter: Gateway to the Middle Ages and Renaissace, ReKN was funded in mid-2014 by a one-year planning grant from the Andrew W. Mellon Foundation. In its broadest strokes, we hope for ReKN to be a reading, writing, production, and *thinking* environment that effectively harnesses multiple content-area projects and already developed tools to facilitate the production of rigorous scholarly research devoted to the early modern period. Such a mission is highly relevant to investigating emerging practices of reading, writing, and research in a digital age.

FROM SCHOLARLY PRIMITIVES TO COMPLEX DISCIPLINES

More than decade ago, John Unsworth attempted to synthesize and discuss a number of "scholarly primitives," a "finite list of self-understood terms" out of which a logic of scholarly research might be discussed. Writing that such a list should consist of "some basic functions common to scholarly activity across disciplines, over time, and independent of theoretical orientation," Unsworth listed a number of primitives: discovering, annotating, comparing, referring, sampling, illustrating, and representing (2000). Expressed as a set of guiding principles for digital humanities tool design, this list of functions has since percolated through the discipline and been taken as a starting point for a number of projects and initiatives.[1] They have also prompted internal, epistemic discussion of what exactly constitutes a primitive in the sense of a fundamental building block of knowledge activity, with Willard McCarty taking the view that primitives should "be discovered pragmatically, gradually, by experimentation" rather than be "an overarching theory or satisfactory formalization" (2002). It is with these issues, and many others, in mind that the Renaissance Knowledge Network has taken shape. In particular, we hope to address how, in practice, tools for humanities research might take shape while at the same time refining how the idea of common methodological practices might be applied to particular content area research.

ISSUES FACING SCHOLARS OF THE RENAISSANCE

There are three primary problems facing researchers of the Renaissance hoping to use digital resources in their scholarship. First, and most importantly, with very few exceptions, digital resources are isolated, stand-alone efforts that fail to provide any affordance for interoperability, portability, or aggregated discovery. There exist a plethora of resources, designed and built at great cost to funders and universities, but

they are difficult to locate, do not speak to one another, and are underused in scholarship. This is true of archives, editions, and databases providing what might be considered primary source information and tools for exploration and analysis. Resources are isolated from one another, necessitating substantial individual knowledge of extant digital resources and technical affordances for diverse implementations; these rich building blocks of scholarship are themselves isolated from innovative tools and platforms for content exploration and analysis. Deploying tools for even rudimentary textual analysis or exploration requires moving among and between a number of file formats, websites, standards, and portals.

Second, if appropriate resources are located, it can be difficult to assess scholarly quality, technical standards, editorial responsibility, peer review status, or indeed any expectations that print-based scholarly resources take for granted. This is an endemic issue within the digital humanities, and the humanities as a whole struggle to understand how best to assess digital projects and ensure that such projects are easily contextualised and assessed by users. In the absence of community-wide standards and metrics – in the form of both measures of scholarly quality and technical interoperability – digital projects that may have much content to add to the community are left unsure how to proceed with sharing, distributing, or leveraging their own resources in wider contexts. Effective structuring of such standards at the point of project funding and design might ensure that new projects are able to interface easily with existing and future resources.

Finally, scholars are faced with a profession being transformed by the use of digital technologies in scholarly communications. Historical models of scholarly publication, research dissemination, authorship, funding, and pedagogy are in flux. More than ever before, scholarly communities of knowledge and practice are a necessity not only in routine professional activities, but to produce new insights and knowledge. Spaces that facilitate building and maintaining such relationships are in their infancy, and many orient themselves toward broad swaths of academia rather than committing deep levels of support and infrastructure to specific areas of research.

ReKN in context

As presented at INKE Whistler 2014, the Renaissance Knowledge Network (ReKN) is a major scholarly initiative designed to develop digital capacity within early modern studies. ReKN is based at the Electronic Textual Cultures Lab at the University of Victoria and is being developed in partnership with Iter: Gateway to the Middle Ages and Renaissance (University of Toronto—Scarborough), the Implementing New Knowledge Environments Project (Social Sciences and Humanities Research Council Major Collaborative Research Initiative), and the Advanced Research Consortium (Texas A&M University). ReKN has been actively investigating digital resource aggregation, discovery, and use in Renaissance studies since 2004. Structured as a knowledgebase of approximately 2 to 3 terabytes coupled with an experimental reading and analysis environment, this prototype demonstrated the exciting possibilities of such a resource, but also made clear the investment of time, effort, and funds necessary to implement ReKN. During 2014–2015, funded by a Mellon Planning Grant, the ReKN team has revisited these results and updated that research from 2004-2009 in

light of new developments in Renaissance studies, recently published projects, innovative technical capabilities, and the changing nature of the scholarly community in Renaissance studies. These efforts resulted in a public-facing directory of resources related to the field; a white paper assessing recent developments in digital Renaissance studies and suggesting possible ways forward; and a two-day consultation meeting held in conjunction with the Arizona Center for Medieval and Renaissance Studies conference and in partnership with Iter and the ARC.

ReKN builds upon previous work in a number of areas undertaken by diverse individuals, organizations, and funding bodies. It also follows more general trends within academia, a drift toward a computational humanities that is gradually being recognized as the interdisciplinary field of Digital Humanities. Federations of aggregated content such as the Networked Infrastructure for Nineteenth-Century Scholarship (NINES), 18th Connect, the Mellon-funded Medieval Electronic Scholarly Alliance (MESA), and the NEH Digital Humanities Startup grant–funded Modernist Networks (ModNets) have made significant advances for their research communities by creating standards and infrastructure for peer review of digital projects, facilitating searches across aggregated collections of digital information, and implementing software and tools that are shared by users of the federation and wider digital research communities. Groups like Iter have dramatically expanded access to aggregated content and published scholarly work related to early modern studies. At the same time, efforts such as the Text Analysis Portal for Research (TAPoR) and Voyant have brought algorithmic textual analysis within the domain of everyday research activities for scholars. Although these analytical tools are powerful, they are widely separated from the content whose exploration they are designed to facilitate. For some, this is no barrier; for others, such separation effectively removes cutting-edge research methods from scholarly practice.

While these efforts to discover and analyze cultural textual information for literary and cultural criticism were underway, the third major area of concern to ReKN—scholarly production—was undergoing lasting shifts. One need only witness the explosion of scholarly blogs, increasingly active Twitter discussions among academics, growth in open access publication, and the publication of digital scholarly editions to envisage the manifold new models of scholarly production currently evolving in the world of academia. The sheer fact of near-universal online availability for journal-based research content is itself an argument for a qualitative shift in how research tasks are undertaken. Publication platforms such as the Institute for the Future of the Book's MediaCommons and experiments in open peer review like that of the journals *Nature* in 2006 or *Shakespeare Quarterly* in 2010 suggest that the ways scholarship has been produced, vetted, and disseminated are undergoing rapid and meaningful changes.

IMPLEMENTING REKN

ReKN will take shape at the intersection of the initiatives, projects, and trends outlined above, providing a single point of entry into an entire world of scholarly activity, specialized for and oriented to scholars of the Renaissance. It is a resource for searching and discovering, for analyzing and exploring, and for publishing and writing. And in all of these diverse activities we are cognizant of the many ways the community

is formed, collaboration occurs, and research is shared and debated. ReKN integrates these insights from its inception not only in the ways researchers interact with each other, but also in the many ways in which digital resources and tools benefit from interoperability and cross-communication. ReKN is at once a unique technological resource, a focal point for diverse digital resources, and a community—of individuals, of practice, and of scholarly work. It is a scholarly working environment and a community of users, researchers, developers, and the public.

In the broadest strokes, ReKN aims to centralize and integrate research, analysis, and production in a single, online scholarly environment. ReKN directly addresses the growing challenge of diverse, isolated, and siloed digital resources by building a scholarly environment explicitly tailored to the needs of humanities scholars studying the Renaissance. This environment seeks to integrate three usually discrete activities integral to scholarly work:

- *Research:* Working with Iter, this environment will make centrally accessible critical materials like peer-reviewed journals and monographs, primary materials in open source and proprietary archives, and stand-alone digital projects that fit into neither category.
- *Analysis:* A number of tools already exist for digital analysis of textual materials, among them Voyant Tools, the TAPoR project, Juxta, and SEASR; the ReKN environment will facilitate the use of tools like these while encouraging the development of new tools designed specifically for the study of the Renaissance.
- *Publication/Dissemination:* Finally, through the use of publication and production platforms like CommentPress, PressBooks, and TEI Boilerplate, ReKN will promote the use of targeted digital tools in scholarly production and publication.

Crucially, ReKN will not be oriented toward the humanities as a whole, but will specifically target Renaissance digital projects, analytical tools, and scholars who would most benefit from such a focused professional research and production environment—aligning with, and co-contributing to the work of, others in the ARC network and beyond.

ReKN has thus from the beginning been imagined as a working space specifically designed for researchers of the Renaissance, a specific historical period with a large body of existing scholarship, robust scholarly attention, internal debates and resources, and an established set of individuals who actively make, use, and cite relevant informational resources. Our goal in building ReKN first had to be mapping this existing field and gaining an understanding of existing resources in both digital and print forms. In other words, it is difficult to know what ReKN should be if we do not know what early modern studies already is. ReKN must harness the complexity of an existing field rather than reduce that field's activities to a set of underlying principles.

Beginning integration

ReKN began several years ago as REKn, the Renaissance English Knowledgebase, an ETCL-based prototyping effort to aggregate English-language materials related to the study of the early modern period. Our initial efforts in mapping the field of early

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modern studies for a full implementation of ReKN, outlined here, in many ways resemble those early efforts. These activities have largely centred on canvassing the field of early modern studies as a whole. Given the backgrounds of those involved, these initial efforts are focused more on the English Renaissance than we would prefer, but we are also cognizant that all work must begin somewhere. As our grant is for a one-year period and primarily designed to allow the formation of community around ReKN and foundational research toward a full implementation of the project, initial research outputs are designed as an annotated bibliography of the field and a longer white paper meant to provide an overview of digital early modern studies and suggest ways ReKN could intervene effectively. This white paper has been completed, and the annotated bibliography is fully populated with items; these have all been fully annotated.

ONTOLOGY OF A FIELD

To perhaps understate matters, the field of Early Modern Studies, even if confined to literary and historical studies, is vast. As an initial way forward, we have created the following ontology of early modern studies and digital humanities, more or less radiating outwards from respective centres in digital early modern studies and the traditional contours recognizable by, for example, a graduate student in the field:[2]

> Appendix 1: Directory of Content Area Resources
>> 1.1 Archives
>> 1.2 Editions
>> 1.3 Databases
>> 1.4 Catalogues
>> 1.5 Geographical/Maps
>
> Appendix 2: Directory of Methodological Area Resources
>> 2.1 Visualization
>> 2.2 Concordancing and Collation
>> 2.3 General Resources
>> 2.4 Network Analysis
>> 2.5 Textual Analysis
>
> Appendix 3: Directory of Publishing and Markup Resources
>> 3.1 XML Conversion and Publishing
>> 3.2 XML-TEI
>> 3.3 Web Publishing and Platforms
>
> Appendix 4: Directory of Academic Publications in Early Modern Studies and Digital Humanities
>> 4.1 Early Modern Studies Periodicals
>> 4.2 Digital Humanities Periodicals
>> 4.3 Major Editions (Early Modern Studies)
>> 4.4 Major Series (Early Modern Studies)
>> 4.5 Major Editions (Digital Humanities)
>> 4.6 Major Series (Digital Humanities)
>> 4.7 Non-traditional Publications (Digital Humanities)

Appendices 1 to 5 should be considered a high-level understanding of the field of early modern studies not in its academic arguments, but in the shape of its resources, publications, conferences, and projects. In other words, this is where we describe *Renaissance Quarterly* and *Early Modern Literary Studies* (both journals in the field) rather than articles addressing specific topics within those publications. ReKN is invested in building a real and lasting community around digital early modern studies; knowing the shape of a field is vital for cross-talk between stakeholders who may approach intersecting disciplines from vastly different perspectives. Content area resources include projects like the Lost Plays Database, a wiki that compiled information on lost plays in England from 1570 to 1642; Old Bailey Online, a database that contains all surviving editions of the Old Bailey Proceedings from 1674 to 1913 (the Old Bailey is London's largest law court); and Early Modern Letters Online, a project that creates and makes accessible metadata for letters from eight large contributing collections.[3]

These projects are one vital part of ReKN's mission, as boutique digital resources are often not indexed, cited by scholars, or used effectively in scholarship. In form these resources range from scholarly editions to database content to GIS projects. Some are open access, some are paywalled. Some are the effort of single scholars, while others have major institutional support. Some are published under the imprint of scholarly presses, while others have never been exposed to any level of peer review. The digital landscape of early modern studies is chaotic. Currently, the bibliography contains several hundred individual items spread throughout the various categories; this number will continue to increase as new items are added and annotations are created for existing entries. Many of the individual projects under consideration have themselves aggregated large numbers of individual items. The Iter Bibliography, for instance, contains more than 1.2 million individual items at the time of this writing.

Appendix 6 of our expanding bibliography concerns academic publications on the areas listed above. Most obviously, this includes journal articles and book chapters published about the content area projects compiled in Appendices 1 to 5. These tend to

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fall into three major categories of publication: digital humanities journals, content area journals, and library and information science journals. A minority take the form of white papers, reviewed but non-traditional online scholarship, or conference proceedings. Much as with Appendices 1 to 5, Appendix 6 begins at the centre (publications on digital projects of the early modern period) and radiates outwards to investigate more general trends in digital scholarship.

Working toward standards

More than many areas of literary and historical studies, early modern England has faced intense academic scrutiny, beginning, arguably, in the early eighteenth century with antiquarian efforts to recover and catalogue medieval manuscripts that had since spread throughout the British Isles. The founding of the British Museum Department of Printed Books in the 1750s can be taken as indicative of such trends. Despite this early start, such classification only got well underway with the nineteenth-century production of a complete catalogue of printed books in the British Museum, though that was not completed until well after mid-century. These later years also saw sustained efforts to organize information on a wide variety of printed content, with A. W. Pollard and G. R. Redgrave beginning the Short Title Catalogue (STC) in 1918 and publishing first in 1926. This volume, alternatively referred to as the STC or Pollard and Redgrave, recorded all books printed in England, Scotland, and Ireland, as well as English books printed abroad, from 1475 to 1640. The first edition contained over 26,000 entries; the second, published in 1976, contained over 35,000. Each publication was assigned an STC number, a number which changed with edition and printing. In many ways the STC became the standards for referencing early modern materials directly (i.e., those not in a prepared scholarly edition). Augmented by the Wing Short Title Catalogue (1641–1700) and the Eighteenth Century Short Title Catalogue, this system represented a large portion of all printed books in the United Kingdom by the 1980s. Around that time, they were all superseded by the digital English Short Title Catalogue, now a resource run by the British Library and maintained in the MARC format. Alongside this monumental effort are smaller resources like W. W. Greg's *Bibliography of English Printed Drama*, giving evidence for a substantial print tradition of providing for information aggregation in early modern studies. A research network that does not include these foundational resources would be poorly accepted by our community of users.

Alongside these field-specific print resources (some of which, but not all, have now moved online), ReKN is faced with a vibrant number of electronic projects invested in precisely this type of work. Ideally, ReKN will be interoperable with other large data aggregation projects, as well as learning the lessons of such efforts moving forward. Foremost among these is the Iter project. Iter was founded in 1994 as a non-profit partnership dedicated to advancing the study and teaching of the medieval and early modern periods via digital means. Associated with, among others, the Renaissance Society of America and the Sixteenth Century Society and Conference, Iter provides online access to a number of journals, full-text e-books, scholarly editions, and the Iter Bibliography.[4] The Iter Bibliography is an Open URL- and Zotero-enabled bibliography composed of secondary source materials, citations for books and journal articles (articles, reviews, review articles, bibliographies, catalogues, abstracts, discographies),

citations for dissertation abstracts, citations for essays in books (including conference proceedings, exhibitions, encyclopedias, etc.). At last count the Iter Bibliography contains over 1.2 million individual items and is continuously updated. Records are kept in MARC format. This data set is foundational to ReKN, whatever its final shape.

Although our final goal is to build an integrated research environment for those working with and on early modern materials, effectively facilitating discoverability is of the utmost importance. ReKN is associated with the Advanced Research Consortium (ARC), a large-scale infrastructure effort to federate metadata for a wide variety of digital projects, archives, databases, and editions. Full integration with ARC is a complex problem, as early modern studies has a large and well established tradition of independent reference and cataloguing infrastructure. Thus, discoverability means that newly produced electronic projects must integrate with existing large-scale standards, or that both print and electronic materials must be updated to a third type of standardization.

Iter has made remarkable progress toward centralizing information access in early modern studies; projects in adjacent fields have also been making great strides. The Advanced Research Consortium federates MESA, NINES, 18th Connect, and ModNets. Each node in the network itself aggregates metadata from digital rescues for particular time periods. (MESA is the Medieval Electronic Scholarly Alliance; NINES is the Nineteenth Century Network for Electronic Scholarship; 18th Connect focuses on the long eighteenth century; and ModNets is in the initial stages of federating resources related to Modernism.) These nodes run on Collex, a software platform custom designed at the University of Virginia a number of years ago. Collex runs on what Bethany Nowviskie calls "a Dublin Core flavor of R[esource] D[escription] F[ramework]" that both allows users to create their own tags and facilitates faceted searching of materials (2007). Given ReKN's close relationship to ARC, we are actively working toward a metadata solution (in both vocabulary and architecture) that allows integration or portability.

ARC runs on Collex. Other major projects like the Canadian Writing Research Collaboratory (CWRC) have chosen other standards and architectures. CWRC is, according to its website, an "online infrastructure project designed to enable unprecedented avenues for studying the words that most move people in and about Canada" (CWRC, 2012, para. 4). More concretely, CWRC is building a database of Canadian digital content (Online Research Canada, ORCA) to "house born-digital scholarly materials, digitized texts, and metadata (indices, annotations, cross-references)" (para. 5, bullet 1). The seminal Orlando Project is a foundational resource for ORCA, with about a dozen projects currently being federated. Beyond even aggregation, though, CWRC hopes to build "a toolkit for empowering new collaborative modes of scholarly writing online; editing, annotating, and analyzing materials in and beyond ORCA; discovering and collaborating with researchers with intersecting interests; mining knowledge about relations, events and trends, through automated methods and interactive visualizations; and analyzing the system's usage patterns to discover areas for further investigation" (para. 5, bullet 2). CWRC deploys a controlled vocabulary drawn from the Getty Art & Architecture Thesaurus[5] to populate

its RDF (CWRC, 2012). In many ways, CWRC is doing for Canadian content and studies what ReKN hopes to do with early modern content and studies—but the two are not compatible "out of the box."

For ReKN, standards and metadata mean two things: first, ReKN must draw on a large-scale, centuries-old research infrastructure in print related to the early modern period, ranging from cataloguing systems to bibliographies of primary materials. Second, ReKN must take shape within widely used and translatable standards for digital assets management in both content-specific areas (e.g., Iter, the ESTC, and EEBO-TCP) and adjacent chronological and subject periods (e.g., the ARC consortium, CWRC, and the Editing Modernism in Canada corpus). Threading this needle requires a great deal of research into shared standards, conversations with other projects, awareness of disciplinary and field-specific histories of aggregation, and a subtle understanding of possibilities for a metadata architecture.

To balance these at times competing needs, we are actively discussing whether or not to build our master, aggregated metadata set in Dublin Core or MARC 21 XML. Of course, this is a somewhat arbitrary choice, as cross-walking is certainly possible between standards, though with possible loss and conversion issues. It is an important concern, for example, that the Iter Bibliography is natively in the MARC format. Similarly, should ReKN deploy a controlled or semi-controlled vocabulary within a chosen metadata scheme, similar to CWRC? NINES and other ARC nodes use open vocabularies, with the only exception being genre (which is chosen at the time of ingest for items). CWRC, as mentioned, uses the Getty Art & Architecture Thesaurus. Iter has partially deployed controlled vocabularies internally. Many of the individual resources we are federating use their own bespoke vocabularies and idiosyncratic systems of organization. What level of standardization is desirable, and what is feasible if desired?

Beyond aggregation

Aggregation by itself, however, is only part of ReKN's mission. As stated above, we aim to build a holistic environment for discoverability, analysis, and research. Again, faced with a complex and deep field, we have chosen to begin by thinking only about text analysis tools. Within ReKN, therefore, a user might run a search or browse the collections, finding particular texts with which to work. If those resources are available in full text, ReKN will allow for those texts to be called in to integrated analytical tools such as the ones listed in the Text Analysis Portal for Research (TAPoR) or deployed within Voyant.[6] Once ported in, full text materials—whether an individual play or the entirety of English drama or the Shakespeare corpus—can be explored and researched using a variety of tools. An EEBO-TCP text could be called into WordFreak or WordWanderer, for instance, to run a concordance on them or explore Keywords in Context (KWIC).[7]

Within ReKN, those interested in building editions might, for example, export textual content directly to platforms like the Versioning Machine or Juxta Commons.[8] Some tools are not Web based, of course, but ReKN hopes to provide access to entries about them or facilitate their download, possibly via TAPoR and similar projects. Eventually, insights from or texts built within these tools will be able to themselves move fluidly to

a production environment for scholarship and editions.

When we examine the diverse landscape of publication types in the field, each one poses difficulties. The Iter Bibliography, for instance, aggregates bibliographic records in the MARC format; each of these records contains a button to "check for full text." Doing so produces an OpenURL query that is directed to an institutional link resolver. When this works, it is flawless; when there are issues with local link resolution (such as a library having switched from the SFX system to the 360 system), it necessitates logging in separately to a library system and finding individual articles in the traditional way. Oftentimes, these articles are in PDF format. Finding the article itself usually ends the trail of links, but the article may contain no OCR content and no metadata. It is useful for reference reading, but any content meant for integration to an article is often typed by hand or grabbed in roundabout fashion via an application like Zotero. This is important to keep in mind when we consider building a production environment for research: for many users, the end goal of this environment will be the production of secondary criticism on early modern texts, criticism that will need to be exported either into Microsoft Word or plain text for submission to a journal for peer review. Eventually those documents will be typeset into PDF and placed online. Publication can thus mean quite different things depending on user community.

Another major category for published digital content is that of the digital scholarly edition. The Text Encoding Initiative has found enduring success as the arbiter of an international standard for the archival preservation and digital publication of historical texts. The list of projects using TEI is extensive, and includes illustrious and foundational content such as the Women Writers Project, the British National Corpus, the Orlando Project, The Acts and Monuments Online, The Shelley-Godwin Archive, and many more.[9] The TEI Guidelines are actively encouraged by the US National Endowment for the Humanities, the Canadian Social Sciences and Humanities Research Council, and the UK Arts and Humanities Research Council. Training opportunities are routinely planned and funded by these organizations. Examples include the Digital Humanities Summer Institute, the Taking TEI Further series (offered in conjunction with the Women Writers Project), the Digital Humanities at Oxford Summer School, and the Culture and Technology Digital Humanities at Leipzig training programs.

For those not needing or wanting to work with the Oxygen software to produce XML documents from scratch, a number of projects have explored how to simplify TEI encoding for non-specialist users. The Canadian Writing Research Collaboratory (CWRC) is developing CRWRC-Writer, an in-browser TEI markup environment with the following features:

- Close-to-WYSIWYG editing and enrichment of scholarly texts with meaningful visual representations of markup
- Ability to add Named Entity Annotations [to texts]
- Ability to combine TEI markup for the text and stand-off RDF annotations
- Ability to export using "weavers" that recombine the plain text, the TEI, and the RDF into different forms (including a TEI-like embedded XML)

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- Documented code for editorial projects to be able to incorporate CWRCWriter into their projects (Brown, 2010)[10]

Similarly, the Folger Shakespeare Library has recently received funding from the Institute of Museum and Library Services to produce a searchable database of encoded semi-diplomatic transcriptions from the Folger's collection of manuscript holdings. Central to the success of Early Modern Manuscripts Online (EMMO) is the use of Dromio, an in-house paleographic transcription platform that integrates highlight and click functionality that, in the back end of the application, results in TEI-encoded XML (Wolfe, 2013). It is meant to be used in conjunction with manuscript image facsimiles provided by the Folger's digital image repository Luna. Dromio is quite similar in its capabilities to CWRC-Writer, although Dromio is far more stripped down and in active development. It is based on Folger servers and available only to those participating in activities such as Folger courses in paleography or sponsored transcription events held at the Folger. The XML documents produced are held internally (Dingman, 2014).

T-Pen stands for Transcription for Paleographical and Editorial Notation and is based at the Center for Digital Theology at Saint Louis University. Much like Dromio, it is designed to enable text transcription and encoding in conjunction with viewing a selected set of manuscript image facsimiles. Interestingly, T-Pen openly eschews TEI standardization; instead, it is designed to allow for anything ranging from plain text transcription to transcription with unique characters (such as the eth [ð] or thorn [Þ]) to XML tags to paratextual annotations. The tool automatically detects lines, columns, and other layout features, and also allows for project collaboration on transcriptions and annotations. Projects can be exported to a number of formats, including XML, plaintext, PDF, RTF, and HTML. It does not validate XML and provides only basic formatting for PDF, RTF, and HTML exports (most users import into a separate program for editing and/or further work) (Ginther, 2012).

Among the many diverse options for digital dissemination, two should be included here: CommentPress and TEI Boilerplate. CommentPress is designed as a WordPress-compatible plug-in that allows for collaborative annotation. First developed by the Institute for the Future of the Book in 2004, it is currently on version 3.5, described thusly on the CommentPress website: "Annotate, gloss, workshop, debate: with *CommentPress* you can do all of these things on a finer-grained level, turning a document into a conversation. It can be applied to a fixed document (paper/essay/book etc.) or to a running blog" (CommentPress, n.d., para. 1). CommentPress is designed explicitly to leverage digital platforms to enact critical arguments about the nature of text and of the book. Several notable works have been published using CommentPress, including Kathleen Fitzpatrick's *Planned Obsolescence*, an experimental issue of the journal *Shakespeare Quarterly* on Shakespeare and New Media, and the currently in-progress book: *(SURVEILLER ET SOURIRE :).*[11]

TEI Boilerplate, on the other hand, is designed as "a lightweight, HTML5 compliant framework for publishing TEI documents. TEI Boilerplate (TEIBP) is designed to bridge the gap between the browser-friendly features of HTML and the semantic

richness of native TEI documents" (Walsh & Simpson, 2013, para. 1). Developed at Indiana University, TEI Boilerplate is designed to allow for the easy publication of complex TEI documents online. Using XSLT, JavaScript, and CSS, researchers can easily transform XML documents on the fly into custom rendered HTML. Changes in presentation can be undertaken by simply editing CSS rather than engaging with XSLT. TEI Boilerplate is also compatible with Omeka, the exhibit building platform developed by the Center for History and New Media. Simply put, TEI Boilerplate allows for non-expert users to immediately publish XML content while immediately being able to edit formatting via CSS (Walsh, n.d.). It is highly useful in teaching contexts as it allows for immediate feedback for thinking through how XML documents may be displayed in multiple ways for different contexts.

As these examples begin to show, digital publication of research materials related to the early modern period can roughly be classified as proceeding in three ways:

1. It is created by publishers in-house and distributed in PDF format via a variety of aggregators and publication libraries like JSTOR or Project Muse. This is especially true of journal articles, which constitute the bulk of secondary literature in the humanities.
2. It is created as an XML document encoded to either the Text Encoding Initiative Guidelines or a project-specific set of standards. This is increasingly common practice for digital scholarly editions and digital archives representing primary source textual content.
3. It is in a stand-alone or boutique format that is difficult to aggregate, catalogue, and otherwise work with within existing scholarly content management ecosystems. These include innovative, non-traditional publication platforms like CommentPress, WordPress, Scalar, TEI Boilerplate, and Roma, but also legacy sites using frames and tables, odd Unicode fonts, and so on.

These are all avenues for producing scholarship related to the Renaissance, and each carries with it difficulties of interoperability, exportability, search and discovery integration, and ease of use. For ReKN to serve as a effective publication platform, it must be agile enough to respond to the variety of scholarly content its users hope to produce.

Conclusion

The Renaissance Knowledge Network has been active as a funded project for approximately six months. In that time, we have undertaken wide-ranging research on existing early modern studies work in both print and digital forms, examined scholarly critique of such efforts, begun conversations with other federation and aggregation efforts, and outlined an initial information architecture and near-term project goals. Our initial planning grant is centred on

1. Producing a comprehensive white paper on the state of existing scholarly research, analysis, and production environments devoted to Renaissance studies, textual editing, and scholarly communication

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2. Organizing a meeting of the research community best placed to contribute to such a document, designed to critique, discuss, and refine a full implementation of ReKN

3. Creating a publicly accessible online resource for individuals to research the affordances of digital tools as related to scholarship of the Renaissance. This is intended to lead to the best understanding of the next goal, namely

4. Implementing ReKN as a partner in the Advanced Research Consortium

We are well on our way to meeting these goals, but doing so requires a continual reappraisal of the challenges faced by integrated resources in a disparate and historically established field.

The benefits of ReKN as an integrated research environment will be of direct and immediate use to scholars of the Renaissance not accustomed to employing digital methods and tools in their work. At its core, ReKN will be a scholarly environment that integrates and facilitates the regular work of Renaissance scholars—information discovery, exploration, and re-interpretation for analysis and publication. These are complex tasks that have prompted the evolution of numerous standards, practices, resources, methods, and platforms. From the aggregated catalogues of the nineteenth century to peer-reviewed journals in the twentieth, from the rise of theory as critical method to the advent of digital editions of primary resources, early modern studies is a wide-ranging and dense set of interconnected practices, resources, and methods. ReKN will both augment what the scholar of the Renaissance already does by allowing for quicker, more efficient interaction with a wide variety of materials and methods and, also, facilitate the search for new research questions and possible answers.

The rise of online archives and editions of primary source content has already transformed how scholars of the early modern period access and use the historical record. Although certainly not without its faults, Early English Books Online, for example, allows, via the Internet and based on subscriptions, global access to facsimile images of a wide range of early modern texts—texts that were previously completely inaccessible except to a small minority of scholars.[12] The Acts and Monuments Online, in contrast, makes multiple versions of John Foxe's crucial work accessible in high-quality editions.[13] The Lost Plays Database, as mentioned above, is a wiki that records mentions of plays and playwrights drawn from a variety of early modern English texts. Early modern studies suffers because these multiple resources are not widely accessed by traditional scholars, partially because they each must be searched individually, have wildly different types of interfaces, and are largely unknown to most scholars. In aggregating the many existing digital resources under a single search interface, ReKN will improve access to individual resources by content area specialists. Easy access to diverse digital resources is an integral part of helping non-digitally conversant early modern scholars to access digital content. These scholars—those conversant with early modern studies but not regular users of higher-level digital tools—are the target audience for ReKN.

Similarly, integrating analytical tools like the Voyant tool set with these search capabilities will bring what can seem to be specialized tools and publication avenues to the immediate attention of early modernists. In many cases, tools such as those listed

in TAPoR and actively developed and released by Voyant are designed to be downloaded and integrated into research platforms designed for specific constituencies. In large measure, such integration has not occurred, and this has contributed to the most cutting-edge tools in textual analysis and exploration – in terms of keyword in context analysis, word frequency, vocabulary richness, and other complex visualizations – not being used by non-digital humanities scholars; in other words, they are invisible to the vast majority of content area specialists.

ReKN is therefore both a way to innovate scholarly practices and to prompt new research possibilities and questions. The use of large-scale linguistic data has allowed Jonathan Hope and Michael Witmore, for example, to explore Shakespeare's generic language (Hope & Witmore, 2010); GIS allows Janelle Jenstad and the Map of Early Modern London team to bridge annotation, research, pedagogy, and visualization in producing a multimodal model of the spaces of early modern London;[14] the Verse Miscellanies Online project brings open source critical editions of seven printed verse miscellanies from the fifteenth and sixteenth centuries online for reading and research;[15] many more examples of projects can be found in our appendices. These projects have also prompted, as we record in Appendix 6, a plethora of critical work on early modern culture. This type of innovative work is simply impossible without high-quality metadata for discovery; online corpora, editions, text bases, secondary criticism, and historical data for research and pedagogy; easily used text analysis tools for large-scale exploration; visualization tools to more efficiently impart research results in multimodal form; and innovative publication platforms to distribute research results to diverse communities, facilitate collaborative research production, and accomplish academic publication. Advanced, shared infrastructure is vital to the production of high-quality research using new tools. ReKN is such infrastructure.

Notes

1. See, for example, Benardou, Constantopoulos, Dallis, & Gavrilis, 2010; Bradley & Vetch, 2007; Palmer, Teffeau, & Pirmann, 2009; Schreibman, Gradmann, Hennicke, Blanke, Chambers, et al., 2013. Many other examples are available.

2. The full, public-facing site containing these annotations can be found at http://rekn.itercommunity.org/ . It is actively in development and continually being populated with new annotations.

3. For the Lost Plays Database, see http://www.lostplays.org; for Old Bailey Online, see http://www.oldbaileyonline.org; for Early Modern Letters Online, see http://emlo .bodleian.ox.ac.uk .

4. The Iter Bibliography is located at http://www.itergateway.org/resources/iter-bibliography .

5. See http://www.getty.edu/research/tools/vocabularies/aat/about.html .

6. See TAPoR at http://www.tapor.ca and Voyant at http://voyant-tools.org for representative examples of the types of tools we are hoping to integrate.

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7. For more information on WordFreak, see http://www.tapor.ca/?id=300; for more information on WordWanderer, see: http://www.tapor.ca/?id=476 .

8. See http://v-machine.org for information on the Versioning Machine and http://juxtacommons.org for Juxta Commons.

9. See the full list, maintained by the TEI, at http://www.tei-c.org/Activities/Projects .

10. See the CWRC team's abstract from Digital Humanities 2012 for a further discussion of CWRC-Writer (Rockwell, Brown, Chartrand, & Hesemeier, 2012). The CWRC site listed in the References contains additional information on the tool.

11. Fitzpatrick's monograph is available at http://mcpress.media-commons.org /plannedobsolescence; the experimental issue of *Shakespeare Quarterly* is available at http://mcpress.media-commons.org/ShakespeareQuarterly_NewMedia; *: (SURVEILLER ET SOURIRE :)* is available at http://mcpress.media-commons.org/regardnumerique .

12. Early English Books Online (EEBO) can be accessed at http://eebo.chadwyck.com /home .

13. See http://www.johnfoxe.org for The Acts and Monuments Online.

14. See http://mapoflondon.uvic.ca for The Map of Early Modern London.

15. See http://versemiscellaniesonline.bodleian.ox.ac.uk for Verse Miscellanies Online.

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