



NATIONAL ENDOWMENT FOR THE

Humanities

OFFICE OF DIGITAL HUMANITIES

Narrative Section of a Successful Application

The attached document contains the grant narrative and selected portions of a previously funded grant application. It is not intended to serve as a model, but to give you a sense of how a successful application may be crafted. Every successful application is different, and each applicant is urged to prepare a proposal that reflects its unique project and aspirations. Prospective applicants should consult the Office of Digital Humanities application guidelines at <http://www.neh.gov/grants/odh/digital-humanities-implementation-grants> for instructions. Applicants are also strongly encouraged to consult with the NEH Office of Digital Humanities staff well before a grant deadline.

Note: The attachment only contains the grant narrative and selected portions, not the entire funded application. In addition, certain portions may have been redacted to protect the privacy interests of an individual and/or to protect confidential commercial and financial information and/or to protect copyrighted materials.

Project Title: The DM Environment: From Annotation to Dissemination

Institution: Drew University

Project Directors: Martin Foys and Shannon Bradshaw

Grant Program: Digital Humanities Implementation Grants

1. PARTICIPANTS

DM Team:

- Co-Director (Technical Lead): Shannon Bradshaw, Associate Professor of Computer Science, Drew University
- Co-Director (Project Manager): Martin Foys, Associate Professor of English, Drew University
- Tim Andres (Computer Science Research Associate), Drew University

British Library Partners:

- Kimberly C. Kowal, Curator of Digital Mapping, British Library
- Peter Barber, Head of Cartographic and Topographic Materials, British Library
(with support of Adam Farquar, Head of Digital Scholarship, British Library)

Implementation Partner Projects (see Appendix A for a full descriptions of projects and members):

- *Dictionary of Old English: Palaeographical Cruxes in Old English Manuscripts*; director: Antonette diPaolo Healey (University of Toronto)
- *Virtual Mappa Project*; directors: Peter Barber, Kimberly Kowal, (British Library: Department of Maps Collections), Martin Foys (Drew University)
- *Parker's Scribes: DM Annotations*; director: Alexandria Gillespie (University of Toronto)
- *Chronique anonyme universelle* editor: Lisa Fagin Davis (Simmons College)
- *Insular and Anglo-Saxon Illuminated Manuscripts: An Iconographic Database*; director: Asa Mittman (California State University, Chico)

2. ABSTRACT for *DM: From Annotation to Dissemination*

Note: evaluators are encouraged to view the short video detailing the core functionality of the DM prototype and how as scholarly projects are using DM, here: <http://ada.drew.edu/dmproject>.

Repositories in all sectors of the humanities enable online access to digitized images, texts, and associated meta-data. But despite increasingly open access to repositories and a number of recent developments in annotation technology and web publication software, it remains extremely expensive and time-consuming to produce widely reusable websites, databases, and other online resources for use in humanities research and teaching. Digital humanists do not have access to an environment where one may (with no technical specialization) easily assemble collections of images and texts for study, produce their own rich analysis data, and publish online resources for individual, group or public use. To provide this capability would substantially reduce manual data creation effort and be a boon across the humanities, from individual to collaborative groups, to institutions with digital repositories who wish to break open their collections for more intimate and engaged public use.

DM (formerly *Digital Mappaemundi*) is an on-line environment that allows users to easily assemble collections of images and texts for study, produce their own rich analysis data, and publish online resources for individual, group or public use. With just 36 months of work supported by only \$100,000 of small-grant funding (including an NEH Digital Humanities Startup Grant), DM has created a functional prototype for just this kind of digital humanities work.

Today, DM is being used by a number of projects, from long-term scholarly initiatives (e.g. the *Dictionary of Old English* project), to collaborative research (e.g. the *Parker's Scribes* group), to individual scholarship (e.g. the digital editing of a medieval *Chronique anonyme universelle* - a 50-foot long genealogical scroll to accompany a printed volume). DM is now ready for multi-year work with five partner projects (including a new one at the British Library) to implement a user-friendly environment that enables users to 1) assemble collections of resources from any combination of accessible repositories; 2) create richly linked data (e.g., annotation networks involving combinations of images, texts, fragments, web resources, and other annotations) and collections, sequences and indices that organize this data; 3) export data in a number of linked data formats; and 4) easily produce publicly accessible and interactive websites based on such data and linked data published elsewhere.

An NEH Implementation Grant will fund a full-time professional programmer and research associates for design and development work, including continuation of current partner projects and the development of an Open Annotation Collaboration (OAC) compliant *Omeka* plugin, to model how one can easily adapt DM data for a wide array of publishing formats. This grant will also fund a new partnership with the British Library: *Virtual Mappa (VMP)*, an on-line collection of historic maps that multiple groups may use to create linked environments of annotations for individual, collaborative, and educational purposes. Once *VMP* is implemented, the British Library can then partner with other institutions to augment this resource, fashioning a virtual collection that allows for true repository interoperability and the potential for deep public, educational and scholarly interaction.

Realizing finished DM environments will enable: scholars to collect online items and document and publish the rich set of connections among them; students to complete partial annotations and other tasks posed by their instructor as part of a class project; and institutions to share richer presentations of digital resources for pedagogical and scholarly use with substantially less effort than now required. With DM, if digital images and texts can be assembled (either privately or freely), regardless of content (e.g. collections of musical scores, architectural plans, modernist paintings, X-rays, handwritten letters) an individual, collaborating group, and/or the public at large could create rich, sophisticated humanities resources for their own use, their communities, or the general public. In a digital world, the DM environment better enables the intellectual and educational work we have always sought to do, and provides new ways to create and disseminate such work.

3. STATEMENT OF INNOVATION

Currently, publishing many humanities resources online requires enormous effort in collating notes and images by hand, clipping images for points of interest, and describing complex relationships between items, all frequently using rudimentary tools. Producing websites based on such data requires large investment in web development. The technologies we propose substantially reduce the amount of time, effort, and funding required to produce and disseminate online humanities resources based on rich annotation and transcription data.

4. STATEMENT OF HUMANITIES SIGNIFICANCE

Implementing the DM environment opens the door for institutions, scholarly groups, and researchers to efficiently produce rich and specific networks of linked data about digital collections that otherwise would be difficult and expensive to realize and share. Educators at all levels will have new opportunities to introduce students to humanities resources in projects they can take from conception to publication. In a digital world, DM better enables the intellectual and educational work we have always sought to do, and provides new ways to create and disseminate such work.

5. NARRATIVE

Note: evaluators are encouraged to view the fifteen-minute video detailing the core functionality of DM on the project website: <http://ada.drew.edu/dmproject>

A. Humanities significance: With current modes of working with images and texts, people still, really, cannot realize the full potential of digital humanism – they cannot make the connections they wish to make, and attach the information they wish to attach, directly and transparently to specific moments on multiple texts *and* images. They cannot easily share or publish this new kind of data. They cannot integrate data from many systems into a coherent whole for collaborative use. DM will allow people to more effectively do the intellectual work they have always sought to do, and provide them with a way to create and disseminate such work in exciting new ways as well.

Currently, an increasing number of resources in all sectors of the humanities enable access to digitized images and texts online or provide deep databases of analytic material. But people still lack an environment in which they may easily assemble images and texts and describe rich sets of connections between them. More specifically, they cannot: flexibly and accurately target specific moments of interest on one or multiple documents, make content-rich annotations for such targets, link these targets and annotations to each other and out to other on-line resources, and then easily (or automatically) export out and re-use the linked data they create to a front-end interface for public (or private) consumption. To provide such a resource that requires no technical specialization to use would be a boon across a range of humanities users, from the individual scholar making notes for research, to a collaborative group working on scholarly edition or pedagogical resource, to institutions with digital repositories that wish to break open their collections for more intimate and engaged public use.

As our letters of commitment and support attest, humanities scholars using DM (beta) are already benefiting. *The Dictionary of Old English* (DOE) project is using DM to annotate and link of examples of Old English words from on-line manuscript collections to individual *DOE* entries. With DM, the *Parker's Scribes* project at the University of Toronto and Oxford University annotating examples of sixteenth-century marginal notations from digital repositories of medieval manuscripts in order to roll this linked

data out as an on-line resource. Individuals are also using DM: Lisa Fagin Davis is digitally annotating all of the content on a *Chronique anonyme universelle* -- a 50-foot-long historical and genealogical scroll with over 1,500 individual figures and events depicted for creation of an electronic edition to accompany a forthcoming academic publication for Brepols; in the *Insular and Anglo-Saxon Illuminated Manuscripts: An Iconographic Database* project, Asa Mittman and his team is using DM to take a 1986 print "database" of 229 codices accounting for nearly all visual iconography in Anglo-Saxon manuscripts and turn it in to a linked, digital environment that will dynamically import images from on-line digital manuscript repositories. This grant will fund a new partnership with the British Library: *Virtual Mappa (VMP)*, an on-line collection of historic maps that multiple groups may use to create linked environments of annotations for individual, collaborative, and instructional purposes. Once *VMP* is implemented, the British Library plans to partner with other institutions to augment this resource, fashioning a virtual collection that allows for true repository interoperability and the potential for deep public, educational and scholarly interaction.

Such projects can be just the beginning if DM is able to secure implementation funding. With a fully realized DM environment, institutions can share their digital resources for scholarly and pedagogical uses. Several museums, for instance, could assemble collections of items and annotations within DM and then easily publish this environment. A group of scholars could then use DM to do their own work on such collections creating custom environments of selections and annotations for research, publication, or public display. A schoolteacher could create assignments for students making his/her own collection of on-line images, targeting details on them, and assigning questions to students in annotations linked to these targets (which students could then answer by modifying). Even these examples are too limited in scope to suggest the full potential of a resource like DM. Essentially, if a collection of images and/or texts can be assembled, no matter what their content (musical scores, X-rays, collections of tattoos, archival photos, handwritten letters and transcriptions), an individual, collaborating group, and/or the public at large can use DM to create rich environments of linked data in a widely reusable or exportable format.

B. Innovation - methods and digital technology: Scholarship involving the analysis of digitized images and texts frequently requires data that defines rich sets of connections between items. For example, in the *Parker's Scribes* project, researchers are analyzing notations made by scribes who curated the library of Archbishop Matthew Parker. In Figure 1 (Appendix B), Aditi, a graduate student at Oxford University, has created an annotation documenting one such scribal note. Her annotation identifies the type of script used and other features that distinguish one scribe from another. Aditi has marked several letters on the folio, created concise descriptions of these letter forms in the "Graphs" field of her annotation, and linked each description to the appropriate marker on the folio. Though not visible in Figure 1, Aditi has also linked each letter form description to glossary entries that describe these forms in detail and include links to markers in this and other folios containing defining examples. To complete the documentation for this annotation, Aditi has identified the scribe as Stephen Batman and linked his name to Batman's profile document, one of many profiles the researchers are creating.

It is these types of complex relationships that make up most databases and other online humanities resources that have emerged in recent years. Medievalscribes.com illustrates this for data similar to that in the example above. Currently, in creating these types of resources, scholars follow an approach something like the following. They produce dozens of pages of notes in Microsoft Word, use graphics programs to clip around regions (e.g., letter forms) of interest and document relationships between their notes, source materials (e.g., medieval manuscripts), images, and other files in a number of tables in Microsoft Excel. When ready to publish, they hire developers to build a website from scratch.

DM has emerged as an environment that enables users to create such data with much less effort, and to maintain and refine it over time. Developed initially under an NEH Digital Humanities Startup Grant, DM embodies many advances in working with images and texts and in creating fundamental humanities data such as annotations, transcriptions, image clippings, and text fragments and in defining relationships between such items. In addition, DM makes its data accessible following best practices for creating open linked data so that it can interoperate with other systems. This means that not only is it easier to produce the data in DM, but that the data is easy to reuse in other projects. DM makes data accessible following

the [Open Annotation Collaboration](http://openannotation.org) (OAC: openannotation.org) data model. OAC is an emerging standard for annotation data developed through collaboration among leading institutions in annotation research and digital humanities including [MITH](http://mith.umd.edu) (mith.umd.edu) and the [Roy Rosenweig Center for New Media](http://chnm.jhu.edu) (chnm.jhu.edu). The OAC standard and extensions such as [SharedCanvas](http://shared-canvas.org/slides) (shared-canvas.org/slides) have proven extremely beneficial in promoting system interoperability and data reuse throughout the annotation community. DM benefits both from the ability to have other systems use the data it produces and the opportunity to consume and integrate data created in other systems following the OAC format.

Though DM in its current form enables people to create rich humanities data easily, it is difficult for people to disseminate their work, because doing so requires substantial investment in web development. Therefore, we propose an implementation that will enable people with no technical expertise to create rich annotations, organize their data for publication, and produce online resources with intuitive interfaces suitable for broad dissemination. The technologies emerging from this project will substantially reduce the amount of effort required for people to create such resources, thus opening the door for many more scholars, teachers, institutions, and others to publish richly annotated resources. People will be able to publish websites based on data created in DM and any other system that produces OAC annotations. As a result, this work will have impact reaching far beyond our own project. Specifically we will:

Objective 1 (O1): Enable DM users to organize their data into collections, indices, and other elements necessary to prepare their data for publication. The data produced will adhere to OAC standards and open the door for systems built by others to consume and publish this data as display-friendly websites based in any platform.

Objective 2 (O2): Create a platform for publishing websites based on annotation data created in any system that produces OAC annotations (including DM). We will construct a set of cooperating Omeka plugins. Release of these plugins will be accompanied by a publicly accessible Omeka site maintained at Drew University. Omeka is designed to enable those without technical backgrounds to build their own web-based exhibitions. Omeka embodies much of the low-level functionality we require, allowing us to focus on building more innovative technology. Importantly, however, our objective is not simply to create

plugins for Omeka, but to further understanding of people's needs in order to develop best practices for publishing annotations, and demonstrate how data in DM can be easily adapted to other platforms.

The technology produced from this project will enable people to create data and websites that they make available for public access or restrict to specific sets of users. Both DM and Omeka support this type of user management. DM enables users to specify others with whom they would like to share their annotations thus provides a means for research teams to work together as they study of a set of resources. Omeka enables site creators to produce information resources based on just their own data or to configure their sites so that "contributor" users may add additional content. Site creators and others who contribute items are responsible to ensure that they either own the items or have permission to use them as specified in their site configurations. With the technology we are building, people will be able to work individually or in teams to produce and publish richly annotated online resources for themselves, their research teams, larger communities of users, or the public. These resources may be maintained exclusively by the creators or opened up for others to integrate annotation data of their own.

Objective 1 (O1): Enhancing data organization functionality in DM. DM users have great flexibility in the types of annotations they create, but they need organization functionality that enables them to more effectively construct narratives of their data, and in a reusable forms. For example, consider briefly the limited utility of a cookbook that is simply a list of recipes. A cookbook becomes far more useful when recipes are indexed by course and ingredients and arranged by occasion and style.

Likewise in an annotation system, it is essential that users be able to define the different ways of approaching their data. For example, one partner project is focused on a 50-foot, fifteenth-century historical scroll (Appendix B, Figure 3). The scroll is a literally continuous, graphic narrative; figures of people, landmarks, and events; and a genealogical chart that flows the length of the scroll. The accompanying long-form text describes Biblical and historical events, and other stories.

In addition to images of the scroll itself, the ways in which people will want to begin exploring this data is through indices of the people, events, stories, and figures. They will also be interested following the sequence and branching of the genealogy or in following every mention of an individual from the first

to the last in the scroll. It is essential, then, that scholars be able to organize their materials to support these ways of exploring resources. Therefore, in DM we can enable users to create indices, to assemble items into collections, and to impose an ordering on a collection if they so choose.

A. Indices. The entries in indices will comprise sets of fundamental concepts (people, locations, events, ideas, etc.) of particular importance to a project. Users may create concepts as needed and assemble them into as many indices as necessary. A given concept may appear in more than one index. In our scroll example, Louis XI appears as an entry in both the alphabetical index of people and in the genealogical index. Users may tag any items they choose with a given concept. Items tagged with a concept will be linked to that concept in all indices for a given project in which it is found. Concepts and indices may be easily reused from one project to another. Users will have the option of carrying over items linked to a concept in a previous project.

B. Collections. As part of the sense-making process, it is also necessary to organize materials into collections. In the scroll example above, an important collection is image clippings of all figures the scroll contains. Returning to the *Parker's Scribes* project at Toronto and Oxford, collections of interest include the folia containing scribes notations, the notations themselves, the profiles for all scribes, and image clippings depicting the portions of folios in which a scribe wrote a characteristic letter form. In addressing O1, we will enable users to create collections of any source materials or items they have created in working with the system. DM already enables users to work with images and texts, to clip images to specific regions of interest, highlight segments of important text, and create annotations. Full implementation of DM can allow users to create collections containing any combination of such items.

C. Sequences. It is common to organize collections alphabetically, by date, or by order of appearance in an image or text, but DM can allow users to specify an ordering according to other criteria. For example, in a map reflecting a journey one needs to identify points visited according to the tale as told in a text. In O1, DM will implement the ability for users to order collections by selecting from a set of standard criteria, and enable them to manually specify ad hoc orderings in a drag-and-drop interface.

Why Organize in DM? Omeka and other publishing platforms give users the ability to create collections of images and other forms of media. Why then should users organize their data in DM? The principal reason for this is so that users may create a complete description of the fundamental materials for their work. They may then publish this data using any framework available to them and use it in other ways. Platforms for publishing annotations in WordPress, MediaWiki, and even other Omeka-based platforms may emerge. If an annotation creation system enables users to fully organize their data, then people may publish their projects to any platform they choose and even move a project from one platform to another without the need to reorganize their data for the new platform. Separating the problems of creating annotations from that of presenting them provides people with a more flexible solution, enabling them to take advantage of new publishing technologies as they emerge, with little additional effort.

Objective 2 (O2): Creating web resources from annotation data. In O2 we will continue work with partner projects to identify a set of best practices for presenting annotation data in published online resources. Having invested much of the past 18 months in developing a draft set of requirements common to all projects, we are now prepared to implement and test them, making refinements where necessary.

The bulk of this effort will be in developing OACPub, a plugin that will enable people to publish web resources based on annotations and the source materials they reference. OACPub will use OAC data to determine the structure (i.e. indices, collections, sequences) and the content (i.e. images, texts, image clippings, text segments, and annotations) of the site. Following best practices for linked data, the items incorporated into the published site can reside anywhere, provided they are publicly available or the user is authorized to view them. Users may integrate annotation data, images, and texts from any combination of systems. Richly annotated maps and texts produced by the British Library can be incorporated with related data served from the Bibliothèque nationale de France, or other on-line repositories, to create a single integrated site presenting richly annotated resources.

Web sites constructed with OACPub, can then be tailored by the creator through the plug-in, adding introductory content and other supplementary pages as needed. Users may choose from a selection of templates with different layout options for views of collections, individual items, navigation bars, etc.

Significantly, though we are building OACPub in concert with the development efforts in O1, OACPub is an independent system. We will implement the plugin so that it will work with OAC data produced by any system. Our plugin will adhere to the Omeka team's plugin development guidelines. It will enable administrators of Omeka sites to make OACPub functionality available to their users.

In addition to releasing OACPub to the community as a downloadable Omeka plugin, Drew University will host an Omeka site in which OACPub will be available to users. Drew has committed to hosting this site for a minimum of five years, and the cost of hosting is minimal to the institution. The site will be accessible using an appropriate, non-Drew url. As a convenience, we will enable DM users to easily publish their annotation projects to this Omeka site with the click of a button. As other sites incorporating OACPub emerge, we will make it easy for DM users to publish to these sites as well.

Innovation: In achieving O1 and O2, we will have substantially reduced the amount of time and effort required to bring many humanities information resource projects to fruition. In addition, this work opens the door for institutions and scholarly groups and researches to produce work that, for lack of funding, would never see the light of day. And educators at all levels will have new opportunities to introduce students to resources in the humanities in projects they can take from conception to publication.

C. Work Plan:

O1: The milestones for this objective will be implementing collections, sequences, and indices in DM, in that order. We will follow this development path because at each stage it will enable us to provide users with a complete set of new functionalities. Each milestone will require a small amount of backend (server and database) work; however, the bulk of the work will be in the user interface. *Co-director Bradshaw will supervise development to complete backend programming and JavaScript development for the user interface. Student research associates will also work on JavaScript work packages.*

A. Collections (Sep. 2012 - Nov. 2012). We will enable users to create and name collections and add items to them as needed. Collections may be composed of any combination of any type of item. The set of items a collection contains may be modified at any time. As with other items, users will be able to create

annotations that target collections. In working with collections, users will interact with DM's Finder (see the left panel of Appendix B, Figure 5). The Finder is used to display lists of items (e.g., search results, annotations targeting a particular item, etc.). Users will add items to a collection using drag and drop. They will remove items from collections by using the Finder's delete functionality.

B. Sequences (Dec. 2012 - Feb. 2013). In DM's collections interface we will add a drop down menu that allows users to select one of several orderings to apply to a collection. The default will be alphabetical. Users may also order items by date, order of appearance in a text or image, and size. We will work with our use cases to ascertain other essential orderings as well. Finally, users may impose an ad hoc ordering by arrange items using drag and drop.

C. Indices (Mar. 2013 - May 2013). Indices will be collections of a new item type we will call a "concept". Concepts will have a name and content. Like text documents and annotations, they may contain any text it is possible to create using DM's Google Docs-like text editor. Concepts will represent people, events, locations, and other fundamental ideas in a project. Users will create indices by creating collections composed of concept items and sequence them as appropriate. Concepts will give users the ability to tag items in much the same way as one can in Gmail and many blogs. Tagging an item with a concept will create a link between the concept and the item, making the item accessible through that entry in every index of which it is a part. Since a given project may require many concepts, we will implement means of batch creating concepts from lists of items in text files.

The indices and collections that users create as entry points to their data will be published in a manifest that may then be imported by systems such as OACpub to determine what should be used as top-level collections in published sites and what additional items must be retrieved to produce a site.

The milestones in O1 are the fruit of nearly 12 months of requirements gathering with our partner projects. The team members involved are well versed in technologies that will be used and are extremely familiar with the DM code base. We have a clear sense of the time that will be required to complete these milestones. To ensure we hit the mark with regard to the user interface and less visible functionality, as we begin each milestone, we will solicit feedback from our use cases based on wireframes and summary

descriptions. As new functionality becomes available partner projects will test and comment. We will fold in feedback to DM revisions. This continues well-established processes with partner projects.

O2: In developing our approach to O2, we have worked closely with five project partners: *Virtual Mappa*, *Parker's Scribes*, *La Chronique Anonyme*, and the *Anglo-Saxon Iconographic Database* (partner projects 1-4 in Appendix A). We also collaborated with the *Dictionary of Old English Paleographic Cruxes* initiative (Appendix A, partner project 5) on consuming raw OAC data from DM. We have identified a set of requirements for publishing such projects. In projects such as *La Chronique Anonyme*, **O2** will facilitate planned scholarly publishing. Despite the diversity of source materials and research agendas, there is little difference among the publication needs of the projects. Instead, we found that the needs of each project reinforced those of the others. The requirements are as follows: 1) make top-level indices and collections readily available; 2) digital edition views for images and texts so that visitors can find points of interest and click to find nearby annotations; 3) item view for annotations that makes the commentary and all targets visible on the same page; 4) Slide-show view for annotation sequences and other collections; 5) keyword search with the ability to sort and constrain results by date, type of item, etc. These and supporting requirements led us to establish milestones A-E outlined below. We do not need milestones for the collection slide-show view or keyword search, because Omeka already implements these requirements satisfactorily for an initial implementation of OACPub.

A. Importing OAC Data (Sept.-Dec. 2012). OAC is built on the more basic data model of RDF. The ItemRelations Omeka plugin supports this data model, but only supports manual creation of relationships between items. In this phase, we will add a small number of additional item types those existing in Omeka and implement a plugin that uses ItemRelations to create relationships automatically based on imported OAC data. *Co-director Bradshaw and the PHP developer will implement the OAC importer.*

B. Indices and collections (Jan. 2013 - Apr. 2013). Omeka implements support for collections, and makes collections accessible in the navigation bar on every page. We will build on this functionality to make top-level indices and other collections created by annotators accessible to site visitors. This will require data modeling and development work to map OAC aggregations (how collections are represented

in OAC) to Omeka collections, so that we can simply use existing Omeka views (i.e. web pages) and themes (i.e. CSS) designed to work with collections. We will need to extend the themes slightly to permit list views for indices. There will be additional work, because Omeka does not permit items to appear in multiple collections and DM does. We will need to implement a solution involving either surrogate items or tags. *Co-director Bradshaw and the PHP developer will be tasked with this milestone.*

C. Digital edition views (May 2013 - Sep. 2013). The digital edition view will be designed to allow visitors to browse an item that can be presented using one image (e.g., map, folio). This view will present the image in a pan/zoom interface. If the image is part of a sequence (e.g., manuscript page) there will be next and previous links. A table of contents for collections can be viewed in a tab that expands from the left. Visitors may hover the mouse over regions of interest. Annotations linked to regions near the hover point will appear in a small box with the titles and some summary text for each annotation. Hovering over an annotation in this box will highlight the linked regions of interest. Clicking on an annotation will take the visitor to that annotation's page. Transcriptions and translations of the page content will be accessible in a tab that expands from the right. OACPub will display texts in a similar view. Regions of a text linked to annotations will be identified with small flags that delimit the regions. Users may hover on flags to see annotations. Next and previous links, tables of contents, and translations will also be part of this view.

The PHP developer and Tim Andres will be tasked with this milestone.

D. Annotation item view (Jul. 2013 - Nov. 2013). We will work closely with partner projects to ensure the complex relationships between items are reflected clearly. In our initial design, annotation text will appear prominently in one panel of the page. Targets of the annotation will be listed in a gallery (e.g., thumbnails) below the text. Clicking on a target will cause a large detail view of that target to be displayed in a panel next to the annotation text. This will enable users to effectively browse the targets that an annotation describes while remaining firmly anchored to the annotation in question. We will use a slightly enhanced version of this view to deal with items that may be targeted by highlights within the annotation text and with other complexities. *Co-director Bradshaw will launch work on this package. The PHP developer will join this effort after reaching the digital editions milestone.*

E. Admin interface (Dec. 2013 - Mar. 2014). This interface will enable those who create a site to choose from among current Omeka themes and new ones as they are created in order to set the look and feel of their site. It will also enable them to configure navigation bars and remove or add top-level indices and collections from the entry points for the site. Finally, users will be able to import OAC data from URLs or as uploaded text files. They will then have a variety of options for selecting which collections should appear and the ability to integrate collections from different annotation systems. Users may schedule regular updates for their sites. Or may choose to update manually. Finally, users will have the ability to create and manage users and user access to resources (i.e. public vs. login required). Small additions to Omeka's existing user management functionality will be required. *Co-director Bradshaw will design the interface. Tim Andres and the PHP developer will implement it.*

F. Evaluation (Apr. 2014 - Aug. 2014). Evaluation in collaboration with our project partners will be a fundamental component of development for each milestone. Once all milestones are completed, we will engage in intensive evaluation and system refinement April-August 2014.

British Library *Virtual Mappa Implementation* (Sept 2012-Sept. 2014): In year one, the British Library team (Peter Barber, Kimberly Kowal, and a research fellow with expertise in historical cartography) will work with co-director Foys to select, and then with DM digitize, annotate and link a collection of BL maps and related geographic texts. In year two, the team will use the implemented OACPub plug-in in *Omeka* to publish this collection on-line, and then work to include maps (already accessible) from other digital repositories, including Cambridge University's Parker Library and Oxford University's Bodleian Library. The result of this work will be a truly interoperable and interactive collection that allows immediate access as well as the potential for deep public and scholarly interaction.

D. Project history and startup phase results: Growing out of an earlier desire to create a digital scholarly edition of a single medieval map, the *Digital Mappaemundi* (DM) project began at Drew University in 2008, and quickly evolved into a larger initiative dedicated to developing a resource for the digital editing and annotating of medieval maps and related geographic texts.

NEH Digital Humanities Startup Grant: 2009-2010: In 2009 DM was awarded a \$50,000 NEH Digital Humanities Startup Grant, which provided funding to develop a prototype of tools to select regions of interest in manuscript images and transcriptions and create linked annotations for these regions. As we were also members of the consultative group for the Mellon-funded *Parker Library on the Web* (PW) project, DM was also invited to participate in a set of use-case studies on interoperability. This work exposed DM to the greater needs of digital repositories for Web 3.0 content enrichment.

Sparked by the DM-PW use-case, our thinking on the tools we had developed for DM evolved beyond maps. Through presentations at symposia and dialogues with scholars from a number of institutions engaged in similar research, we came to the realization that the technology we were developing could meet the needs for annotation of a wide variety of digitized manuscript resources. DM was well positioned to build out this set of tools to allow scholars with even the most basic of computer skills to precisely select and flexibly annotate areas of a chosen digital image, be it a map, a set of manuscript images, or anything else. In 2010, for the second half of our NEH start-up grant, we refocused our project to target the development of just such a general-purpose suite of annotation tools for digital humanities resources, using our existing data of medieval maps and annotations as a ready use-case study. This work required a significant redesign of the way in which images and texts could be selected and annotated, as well as how the data created by such activity could be stored, recalled and searched. Through the NEH grant, the DM project achieved the following objectives:

- Image navigation and annotation creation functionality
- Flexible selection of target areas on an image through single coordinate points, segmented lines, bounding boxes, or user-generated polygonal spaces.
- Ability to link annotations to multiple target selections on the same or different images.
- Customizable taxonomic categories
- Initial work on selection of target areas for text (words or strings)
- Restructured data architecture, based fully on JavaScript and js-compatible web services
- Fully functional prototype for the annotation of digital images and texts

Mellon Scholarly Communications Grant: 2010-2011: Based on the success of the work finished under the NEH startup grant, the DM project was awarded a \$50,000 Scholarly Communications grant by the

Mellon Foundation to expand and refine functionality and to test the resource with a number of diverse electronic scholarship projects. During this grant, the DM project completed the following objectives:

- Moved DM from prototype stage to beta
- Radial context menu interface and two-frame “anchor and pivot” display
- Full support for the target selection and annotation of text files
- Generation of unique URLs (web addresses) for each image/text section and related annotation
- Ability to create links between individual selections of images and texts
- Ability to link multiple images/text selections to a single target (image or text)
- Textual formatting and linking to external web URLs within annotations
- Exporting of image selections for use outside DM environment

In collaboration with the Stanford University’s *DMSTech* project, which aims to promote scholarly tools for use with collections of digitized repositories, the *Digital Mappaemundi* project identified and worked with several scholarly projects that used the DM environment to create data for their own use. See Appendix A, “Implementation Partner Projects” for a list of these ongoing projects, which range from individual scholars to large scholarly publication resources.

Summary: At the end of just 30 months of work, and with only \$100,000 of funding, the *Digital Mappaemundi* project has developed an environment for the generation of collaborative and ongoing scholarship on digital images and texts, with a healthy coterie of institutional partners and early test projects. At this point, DM is ready for a multi-year implementation initiative, with the final goal of a publicly available, open source tool containing both the current annotation software and front-end production to allow for easy public presentation and consumption. As our letters of commitment attest, users of DM, from long-term projects such as the *Dictionary of Old English* to individual scholars making research notes, are already benefiting from the resource’s potential. NEH funding will allow DM to fully implement DM for use by current projects, and importantly act on a partnership with the British Library to virtually collect and display historic maps drawn from several digital repositories. The result of this work will be a truly interoperable and interactive collection that allows immediate access as well as the potential for deep public and scholarly interaction. Such work will then become the template for future applications of the DM resource across a broad range of digital humanities activity.

E. Environmental Scan: Fundamentally, while there is a host of options currently available or in early development for annotating digital materials, there is no resource in DM's state of readiness for implementation across a range of projects. Further, no available annotation resource provides the digital tools: for making annotations and linked data on graphic and textual content in the way DM currently can; and for easily exporting it for consumption in a variety of publishing platforms as we are developing. Some existing resources overlap with some of DM's annotation capability, but only on a more basic level of functionality. As this environment scan should make clear, none currently matches DM's versatile capacity to allow users with low levels of technical expertise to annotate both texts and images within a network of linked and searchable data, or has DM's immediate goal of implementing a user-friendly front-end interface for organizing and presenting such material as accessible digital scholarship.

Existing and developing annotation resources for Humanities scholars can be characterized in two distinct approaches: **a) image-centered annotation**, with a goal of providing basic textual notation of images or regions of interest on images; and **b) transcription-centered annotation**, with a goal of producing a digital text of images containing textual material, often with the ability to link corresponding regions of an image to the text it contains (e.g. a line-by-line relation of image data to transcribed text). In addition, initiatives in a third category, **c) clearinghouses**, at times also relate to this scan.

Most existing tools permit very limited networks of data – usually one-to-one correspondences of annotation and target, and none currently allows agile selection and linking of specific regions of interests on both image and/or text files – that is, the creation of a networked environment for [image-text] relationships, [image-image] relationships, and/or [text-text] relationships.

A) Image-centered annotation: Basic image annotation – the association of simple metadata – is widely used in popular social media such as Facebook and Flickr, but target selection is crude, limited to rectilinear regions, with annotations limited to simple and at times monolithic data structures. Such popular resources provide no ability to export easily the linked data to other environments. A number of more sophisticated scholarly resources for image-centered annotation exist; the following represents several of the most relevant for Digital Humanities work: *The UVic Image Markup Tool Project*

(tapor.uvic.ca/~mholmes/image_markup/) allows for annotation schemes of images, but limits target selection to rectilinear bounding boxes, is Windows OS specific, and based in TEI and XML, requiring some technical proficiency to use effectively. The TILE (Text-Image Linking Environment) initiative at MITH developed AXE (mith.info/tile/tools/), is Ajax XML encoder that allows you to select a polygonal area of an image and attach XML metadata. AXE, while open in nature, does not have the flexibility to enable individual scholars to easily create and populate multiple tagging categories, or to create networks of linked data inside a collection. AXE was in 2010 planned to be integrated into the Zotero research tool, but the current state of this initiative is unclear. *SALSAH* (System for Annotation and Linkage of Sources in Arts and Humanities: www.salsah.org) is an annotation toolset under development at the University of Basel. SALSAH shares some feature overlap with DM, but is still the earlier phase of prototype development, and is not ready for public implementation across a variety of projects. Like SALSAH, *Yuma* (yuma-js.github.com/) is a European project in the early stages of development, with similar goals of image annotation and linked data interoperability, and is very much in prototype development, with the bulk of its desired functionality still listed as “to do.” *Omeka* (www.omeka.org) is an open source platform for the publishing humanities materials on-line that is rapidly growing in popularity. While it has a plug-in to allow image annotation, it is limited in functionality, allowing the typical rectilinear target selection and the creation of a simple pop-up text field related to the target area. Omeka is also the platform that the DM project wishes to develop as the end-user interface to display the more sophisticated linked data created within DM. Our implementation will provide a resource that supersedes Omeka’s current annotation tool.

b) Transcription-centered annotation: The other main category of scholarly digital annotation tools are ones dedicated to transcription of digital texts difficult to automatically generate through OCR or other means (e.g. medieval manuscripts, texts with untraditional layout or formatting, handwritten documents, and the like). In transcription resources, textual annotations (i.e. the transcription) can usually be made to a targeted selection of an image, but such [image-text] linking is generally geared toward document-specific textual production, alignment and/or analysis, and not for individual users to create use-specific annotations, editing projects, and networks of relationships across numerous digital

images/texts. Additionally, transcription resources do not easily accommodate annotations of non-textual content of digital images, or text which varies from typical linear display. Transcription resources range from traditional XML and TEI (Textual Encoding Initiative: www.tei-c.org/index.xml) coding (which requires a degree of technical proficiency), to dedicated transcription and textual analysis resources such as T-PEN (Transcription for Paleographical and Editorial Notation: t-pen.org), Textgrid (www.textgrid.de/en.html), or AGORA (web.arch.usyd.edu.au/~adong/research/agora/index.html). Other initiatives, such as applications of Zooniverse (www.zooniverse.org), seek to crowd source transcriptions or annotations of collections of images; the Ancient Lives project (ancientlives.org), for example, gives visitors un-transcribed papyri fragments and reference tools to create a transcription. Significantly, DM likewise provides the capacity to easily create transcriptions of documents, but bundles this capacity with a far more agile set of tools to allow annotation beyond basic transcription.

c) Clearinghouses: Finally, the past decade has seen the rise of a number of initiatives seeking to be protocol hubs for digital annotation and other digital Humanities work. These resources do not seek necessarily to create tools themselves (though they may), but rather to aggregate such tools, and provide protocols for creating and implementing them. Projects include *Zotero* (zotero.org), *Omeka* (omeka.org), *Open Annotation Collaboration* (openannotation.org), *Project Bamboo* (www.projectbamboo.org/), and *DMSTech* (stanford.edu/group/dmstech). As an open-source initiative, features within DM project can also be adapted to the particular requirements of such projects and protocols. DM has already worked closely with projects originating with *DMS-Tech* and is developing within the *OAC* standards. In implementation work, DM will also use *Omeka* as a demonstration of how DM annotations and data networks may be adapted and “rolled out” for publishing in such user-friendly platforms.

F. Staff:

Co-Director and Technical Lead (10% for academic year, 40%, summer term): **Shannon Bradshaw** is an Associate Professor of Computer Science at Drew University. Shannon's areas of expertise include information science and interaction design. He has published many papers in these areas and built a

number of software systems related to this research. Shannon's work also extends to consulting engagements with large firms such as Morgan Stanley and Goldman Sachs and to a variety of smaller firms in the New York City and Chicago areas. Shannon has served as the technical lead on the DM project for the past 30 months, overseeing design of the user interface, system architecture, and database and has built several components of the system. During this grant, Shannon will be responsible for:

- managing development & managing evaluation phase
- managing user-experience design refinements in collaboration with project partners
- user interface development in Javascript for OACPub Omeka plugin
- data modeling and database design
- PHP development for OACPub
- documentation authoring

Co-Director and Project Manager (10% for academic year, 20% for summer term): **Martin Foys** is an Associate Professor of English at Drew University, and brings over 15 years experience in electronic scholarship design and development. Martin has published widely on medieval maps, media history and theory, and on the intersection of digital technology and medieval studies, and has consulted on a number of digital humanities initiatives. For DM, in addition to being the project manager and helping design the resource's successive stages of form and function, Martin has also directed the *Virtual Mappa Project*, a foundational case study for the DM resource. During the time of this grant, Martin will be responsible for:

- the overall management and work flow; day-to-day budgetary oversight
- on-site testing and use of tools; evaluating and contributing to the design and functionality
- managing communication with implementation partners
- co-directing *Virtual Mappa Project* implementation with British Library
- submitting reports to the *NEH* when appropriate

Student Computer Science Research Associate (30% for academic year, 100% for summer term): **Tim Andres** has worked on the DM project since May 2011. He is an experienced and talented Javascript programmer with deep understanding of DM's objectives and code base. Tim will be responsible for:

- user interface development for OACPub
- CSS development & occasional data modelling and PHP coding

Software Developer (100% for 18 months, position to be filled upon funding): The Software Developer will be an experienced PHP developer with good teamwork skills and a track record of bringing projects to completion on time. S/he will account for the bulk of the funding requested in this proposal. In addition

to strong PHP skills, s/he will have experience in relational databases and object-relational data modelling. Ideally s/he will have experience working in the Zend web development framework in which Omeka is built. Javascript and CSS experience are a plus. The developer will be responsible for:

- PHP development for OACPub and associated plugins
- Data modeling for OACPub
- Unit and integration testing & trouble-shooting for project partners

British Library Staff (*Virtual Mappa Project Implementation*; 5% supervision and oversight): **Peter Barber**, Head of Cartographic and Topographic Materials has been responsible for manuscript maps at the British Library since the early 1980s and is a trustee of the Hereford Mappaemundi. He has curated exhibitions on mappaemundi in London, Hereford and Milan and has published extensively on them. Much of Curator of Digital Mapping **Kimberly C. Kowal's** work with geospatial data, tools, and metadata over the last ten years has involved making manuscript and antiquarian maps available using digital methods. She is a member of the JISC Geospatial Working Group, and regularly presents and publishes in international forums. With a research fellow (50% for 24 months) they will coordinate with co-director Foys to implement the *Virtual Mappa Project* (VMP) (for details, see *Work Plan*, above).

Implementation Project Partners: Please see Appendix A for overviews of the five ongoing projects which through this grant will be able fully to implement the DM environment. The projects range from work with national institutions and long-term editorial projects to individual academic research.

G. Final product and dissemination:

Thanks to an ongoing set of projects using DM, support from Stanford's *DMS-Tech* initiative, and a 2010 *New York Times* article which featured an early version of the project, DM already has a robust presence in Digital Humanities. The British Library's upcoming partnership on developing resources through DM, with an eye to even broader applications for the BL's public will also help disseminate awareness and use of DM tools. As part of a larger initiative to provide a "kickstart" package for humanists wishing to use scholarly tools with repositories of digital materials, the above-mentioned *DMS-Tech* will be able to include the more developed DM toolset as one of its offerings, furthering

dissemination and awareness of the resource. In addition, co-directors Bradshaw and Foys will present on the finished environment at scholarly sessions in digital humanities at conferences in their fields, as will members of the partner projects. DM will also be a featured workshop at the 2013 NEH Institute for Advanced Topics in the Digital Humanities: *Linked Ancient World Data Institute* (see letter of commitment). The white paper we generate for this grant will likewise serve as an overview to how to take the DM environment and realize your own digital humanities goals with it.

Fundamentally, however, one of the goals of the proposed work plan is to establish DM as a standalone and fully open-source product, so that those who might benefit from the resource will be freely able to do so, and make others aware of it. As such, we intend any tool we develop within DM to be open source, and made available on SourceForge, github, and other similar open-source repositories. DM is expressly committed to principles of use pursuant to the open-source guidelines such as [OpenSource.org](http://opensource.org). For example, our annotation functionality is based on the OpenLayers (openlayers.org) system for display of tiled images and markers. OpenLayers is distributed under the BSD (www.opensource.org/licenses/bsd-license.php) open-source license, one of the most permissive of open-source licenses as to how code can be used and distributed. As the environment continues to develop, we are designing it so that if institutions or users elect, they use only our annotation and linked-data resources to generate data, and then export use/publish/store their annotation data elsewhere. Others may choose to use the DM annotation store (web service) maintained at Drew University so that they need not develop one of their own – Drew University server licenses are currently funded through the next decade, so maintenance of annotation and link data for external repositories –itself a relatively low level of data - can be assured for the next generation of DM use and development. Finally, we will have implemented our OACPub publishing plugins in *Omeka* and listed and available for download on omeka.org. *Omeka* already has over a thousand projects using its platform, and so the ability to publish annotation data in *Omeka* using OACPub will greatly enhance both dissemination and sustainability.

6. SUSTAINABILITY PLAN

Note: Other aspects of sustainability are covered in the Data Management Plan, below, and in the “Final Product and Dissemination” section of the Narrative, above.

The long-term financial needs of this project are primarily in personnel with some needs in computer server equipment. The co-directors (Bradshaw and Foys) have made this work a centerpiece of their research agendas and are committed to continuing its development, even between funding cycles, if necessary. The project to date has been successful in acquiring necessary funding for summer support and research associates for a period of more than two years and has maximized the return on this investment.

Drew University is fully committed to the project as part of an initiative for digital humanities that has substantial support among the trustees, the President’s and Dean’s offices, and from a number of academic departments with faculty doing digital humanities work including: English, Computer Science, Classics, GIS, Archaeology, Classics, Religion, Art History, and the Library. Drew also has a long-standing summer research program that provides stipends for faculty and student research associates. We have been the recipients of awards under this program for the past three summers. In direct support of this project, Drew has allocated sufficient funding for nearly ten years of continuous server upgrades and technical support so that computing equipment are no longer a concern.

Finally, DM has established partnerships with a number of research groups and institutions in the United States and abroad. We believe that at least two of these may lead to funding opportunities beyond this grant. In its own right, DM and the technologies proposed here have broad application. In addition to NEH we have identified a number of other possible funding sources including the Institute for Museum and Library Services, The Andrew W. Mellon Foundation, and the National Science Foundation.

7. DATA MANAGEMENT PLAN

This project will produce software for purposes of creating information and data. There will be four software systems and an indeterminate amount of data resulting from this project. The primary output of this project will be software. That software is as follows:

- The DM user interface. This is a software library containing JavaScript and CSS code and based on Google's closure JavaScript package.
- The DM web service. This is a web software application on the Django web development framework. It contains Python code and html files. The web service is designed to support requests from the DM user interface and other authorized clients. It allows clients to retrieve, save, and update annotation data other items.
- OAC importer Omeka plugin.
- OACPub Omeka plugin

The data created will be as follows:

- Users will continue to create annotation data and upload images and texts in DM.
- They will create websites and the data on which they are based in OACPub.

Servers: Drew University has committed funds to maintain the servers on which DM runs and the servers that will host the Omeka instance we will install as part of O2. These funds are sufficient to maintain the servers for a minimum of six years from the start of the project. Drew's technical staff manages these servers as part of their regular duties. The specifications on the existing DM server are as follows: 72GB of RAM, eight cores, and 1 TB of disk. This server is due to be updated in eighteen months. The server on which Omeka will run will have a similar profile. Disk space can be easily expanded to many terabytes.

Software: All DM software is maintained in our svn repository. The same will be true of our Omeka plugin code. Our software management policies follow best practices in the discipline. The svn repository is on a schedule of daily incremental backups and weekly full backups. Following revisions planned for Summer 2012 we will release the DM client library as an open-source project on GitHub. The client

library is designed in a modular fashion to enable other projects to pick and choose among components of use to them. Because the client communicates with web services using OAC, other projects may use our library to implement annotation functionality with the data stored in our server or any other that users OAC for data communications. As we complete the OAC importer and OACPub Omeka plugins we will release them on GitHub. In addition, they will be installed on our Omeka server. Finally, we will also have these plugins listed and available for download on omeka.org. If funded, we commit to maintaining the software produced by this project for a minimum of six years. By making our software open-source, it is our objective to maximize its sustainability by enabling the humanities software development community to refine and extend its functionality.

Data: All data is backed up following a schedule of daily incremental backup and weekly full backups. DM data may be exported by users at any time in both OAC and JSON formats. All DM data is saved in an append-only database which means every version of a user's data from its creation to the most recent change is maintained. The ability to publish annotation data in Omeka using OACPub will enable users to place their data in any Omeka site that enables users to install this plugin. If funded, we commit to maintaining this data for a minimum of five years.

11. APPENDICES

APPENDIX A: Implementation Partner Projects

1. *Virtual Mappa Project* (directors: Peter Barber, Head of Maps Collection, British Library, Kimberly Kowal, Curator of Digital Mapping, British Library, Martin Foys, Drew University)

Description: (see also Appendix B, figures 5-6 and descriptive captions)

Virtual Mappa Project began in 2008 as *Digital Mappaemundi*, the original research initiative that led to the development of the current DM resource. *VMP* has evolved into a case study in how medieval maps of the world and related geographic texts may be collected, annotated and networked. Now partnered with the British Library, NEH funding will allow *VMP* to develop into a truly interoperable resource that can virtually collect and display historic maps drawn from several digital repositories, including the British Library, Oxford's Bodleian Library, and Cambridge's Parker Library. This resource will allow multiple groups of users to create linked environments of annotations for individual study, scholarly collaboration, classroom use, and public exploration. The result of this work will be a truly virtual collection that allows immediate interoperability as well as the potential for deep public and scholarly interaction. Significantly, it will also help develop, test and establish a full implementation of the DM environment where: users could collect online items and document and publish the rich set of connections among them. Such work will become the template for future, broader applications of the DM environment.

As a new partnership with the British Library, *VMP* will be funded in part by the NEH Implementation grant. In year one of work, the British Library team (Barber, Kowal, and a research fellow with expertise in historical cartography) will work with co-director Foys to select, and then with DM digitize, annotate and link a collection of BL maps and related geographic texts. In year two, the team will use the implemented OACPub plug-in in *Omeka* to publish this collection on-line, and then work to include maps (already accessible) from other digital repositories, including Cambridge University's Parker Library and Oxford University's Bodleian Library.

Project Directors Bios: (see "STAFF" section of proposal narrative)

Project Team: research and programming associates - *pending funding by this grant.*

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2. *Parker's Scribes: DM Annotations* (director: Alexandria Gillespie, University of Toronto)

Description: (see also Appendix B, figure 1 and descriptive caption)

Scholars at the University of Toronto and the University of Oxford are using DM to distinguish and characterize the scribes of Archbishop Matthew Parker's manuscript collection. Their approach is based on the handwriting in scribal notations appearing throughout the more than 500 manuscripts in this collection. The project is taking the opportunity provided by Parker on the Web, (<http://www.parkerweb.stanford.edu>) to index all of the notes left by Parker and the Elizabethan scholars, secretaries, clerks, copyists, and even forgers who built and made use of his collection of books. This work links the hands that appear in Parker's books to the men who worked for him, and then extends outwards – to printed and manuscript books and documents that are not in the Corpus Christi collection but which were once part of Parker's great bibliographical project.

Project Director Bio: Alexandra Gillespie is an Associate Professor, Centre for Medieval Studies, University of Toronto. Recent work includes: *Print Culture and the Medieval Author: Chaucer, Lydgate, and Their Books, 1473-1557*. Oxford UP, 2006; “The Myth of the Cheap Quarto.” *Tudor Books and Readers: Materiality and the Construction of Meaning*. Ed. John N. King. Cambridge UP. Forthcoming; “William Caxton and the Invention of the Printed Book.” *The Oxford Handbook of Tudor Literature, 1485-1603*. Ed. Cathy Shrank and Mike Pincombe. Oxford UP, 2009. 21-36; “Analytical Survey 9: The History of the Book.” *New Medieval Literatures* 9 (2007): 245-86.

Project Team: *Principle Investigators:* Alexandra Gillespie, Simon Horobin, Reader in English Literature and Language, University of Oxford; *Assistants:* Emma Gorst, University of Toronto; David Wilton, University of Toronto; Aditi Nafde, Oxford University; *Advisors:* Lawrence Warner, Lecturer in English, Sydney University, Australia; Timothy Graham, Professor of Medieval History, University of New Mexico; William Sherman, Professor of Renaissance/Early Modern Studies and Director of the Centre for Renaissance and Early Modern Studies, University of York, UK; Paul Patterson, Assistant Professor, St Joseph’s University, Philadelphia

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3. *La Chronique Anonyme Universelle jusques'à la mort de Charles VII*: (editor: Lisa Fagin Davis, Simmons College)

Description: (see also Appendix B, figures 3-4 and descriptive captions) A translation, critical edition and detailed study of a fifteenth-century French world chronicle scroll, to be published by Brepols Publishers in 2013) by Lisa Fagin-Davis. Over fifty feet in length and containing over 1,500 genealogical and historical items, this scroll has been digitized and reassembled virtually. Dr. Fagin-Davis is using DM to create an interactive digital edition of this scroll to accompany her book.

Project Director Bio: Lisa Fagin Davis received her PhD in Medieval Studies from Yale University in 1993. In addition to teaching courses on medieval manuscripts at the University of Pennsylvania, UCLA and Simmons College, she has catalogued medieval manuscript collections at Yale University, the University of Pennsylvania, Wellesley College, the Museum of Fine Arts Boston, the Boston Public Library, and several private collections. Her publications include: the *Catalogue of Medieval and Renaissance Manuscripts in the Beinecke Rare Book and Manuscript Library, Yale University, Vol. IV* (with R. G. Babcock and P. Rusche, Tempe, 2004); *The Gottschalk Antiphonary* (Cambridge University Press, 2000); numerous articles in the fields of manuscript studies and codicology; and the forthcoming monograph, *La Chronique Anonyme Universelle jusques'à la mort de Charles VII* (a translation, critical edition and detailed study of a fifteenth-century French world chronicle, to be published by Brepols Publishers in 2012). Dr. Davis was a member of the EAMMS working group that established initial standards for electronic cataloguing of pre-1600 manuscript material and is currently serving on the Digital Scriptorium Bibliographic Standards Committee. With Melissa Conway, Davis is co-author of the *Directory of Pre-1600 Manuscripts in the United States and Canada*, published online by the Bibliographical Society of America.

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4. *Insular and Anglo-Saxon Illuminated Manuscripts: An Iconographic Database* (director: Asa Simon Mittman, California State University, Chico)

Description: (see also Appendix B, figure 7 and descriptive caption)

Asa Mittman and his team are using DM to develop a new digital and online version of Thomas Ohlgren's 1986 print catalogue (and proto-database) *Insular and Anglo-Saxon Illuminated Manuscripts: An Iconographic Catalogue*, to expand access to, streamline the use of, and augment with digital images the original content of this invaluable resource for medieval art historical study. Ohlgren's work is a print index and cross-listed description and keyword list of 229 codices accounting for nearly all visual iconography in Anglo-Saxon manuscripts. This catalogue is the standard reference in the field, but is out of print and inaccessible to many scholars and students. Equally significant, though, is how cumbersome it is to use in its old media format. Through DM, this project is breathing new life and utility into this old resource by re-realizing it as a network of linked data and annotations. Once phase I of the project, the linking of all textual data, is complete, images of illuminations accessible through digital repositories will then be included in as they are made available.

Project Director Bio: Asa Simon Mittman is an Associate Professor of Art History at California State University, Chico. Recent work: *Maps and Monsters in Medieval England* (Routledge, 2006; paperback 2008); *Inconceivable Beasts: The Wonders of the East in the Beowulf Manuscript* (ACMRS, 2011); and a number of articles on the subject of monstrosity and marginality in the Middle Ages; *Research Companion to Monsters and the Monstrous* (Ashgate, 2011).

Team Members: Project Team Members: *Director:* Asa Simon Mittman (California State University, Chico); *Research Assistants:* Jamie Blankenship, Vanessa Leong, Rikayla Valenzuela, Chelsea Nielsen, Sydney Williams (California State University, Chico)

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5. *Dictionary of Old English, Palaeographical Cruxes in Old English Manuscripts* (director: Antonette diPaolo Healey, University of Toronto)

Description: (see also Appendix B, figure 2 and descriptive caption)

The Dictionary of Old English (DOE, <http://www.doe.utoronto.ca/>) is a born-digital lexicographic project the aim of which is to define the vocabulary of the first six centuries (CE 600-1150) of the English language using the technological aids available at the start of the twenty-first century. From time to time DOE cites a quotation where there is a crux or some sort of problem with the manuscript reading. Using DM, scholars at the DOE are identifying and annotating examples of textual cruxes found in manuscripts in Cambridge University's Parker Library collection. DM allows the DOE team to select sections of a manuscript image, link annotation data to this selection, and then generate a thumbnail image for export. Thumbnail images and annotation text will be included in DOE entries referencing cruxes.

Project Director Bio: Antonette diPaolo Healey is the Angus Cameron Professor of Old English Studies at the University of Toronto and the Editor of the *Dictionary of Old English* project. Recent work includes: *The Dictionary of Old English Corpus on the World Wide Web* (Toronto: DOE Project 2009); *The Dictionary of Old English Corpus in Electronic Form*, with TEI-P5 conformant-version by Xin Xiang (Toronto: DOE Project 2009) on CD-ROM, 49 MB; *The Dictionary of Old English: A to G*, with electronic version for Windows developed by Xin Xiang (Toronto: Dictionary of Old English Project 2008, on CD-ROM; *The Dictionary of Old English: A to G* online, with web interface by Peter Mielke and Xin Xiang (Toronto: Dictionary of Old English Project 2007).

Team Members: Principle Investigator: Antoinette Healey, Editor, Dictionary of Old English, University of Toronto; *Assistants:* Stephen Pelle, University of Toronto; Alex Fleck, University of Toronto; *Systems Analyst:* Xin Xiang

Appendix B. Figures

(Note: for a better sense of DM's core functionality, and the ways projects are using it, please watch the fifteen-minute video available on the project website: <http://ada.drew.edu/dmproject>)

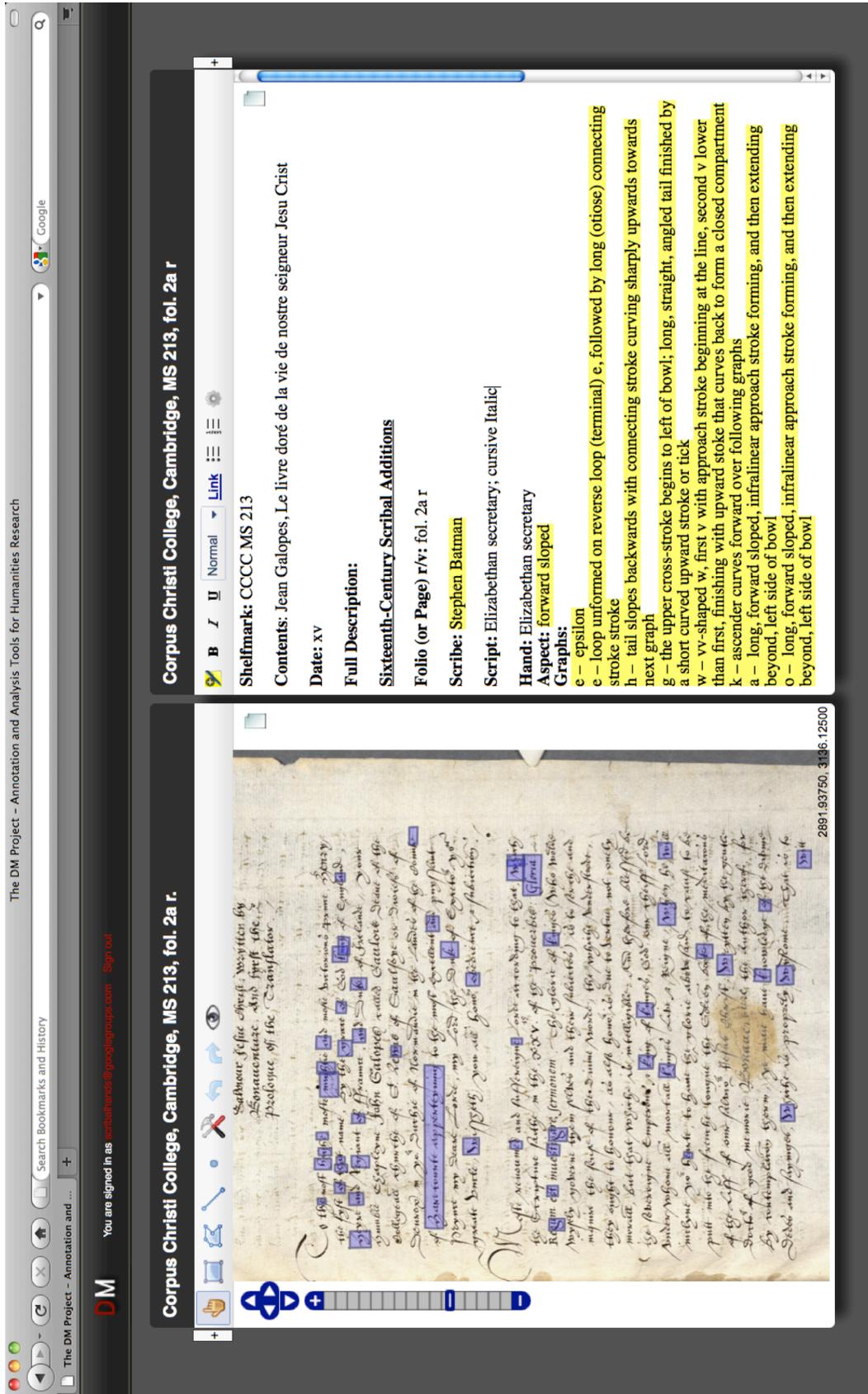


Figure 1: Parker's Scribes project. This annotation links to and describes the manuscript page as a whole (linked through the "page" icon visible in the top right corner of each display). It contains highlighted portions (e.g., in "Graphs" field) linked to individual regions of interest on the page. The taxonomic fields in the textual annotation are generated through use of a customizable template inside the DM environment.

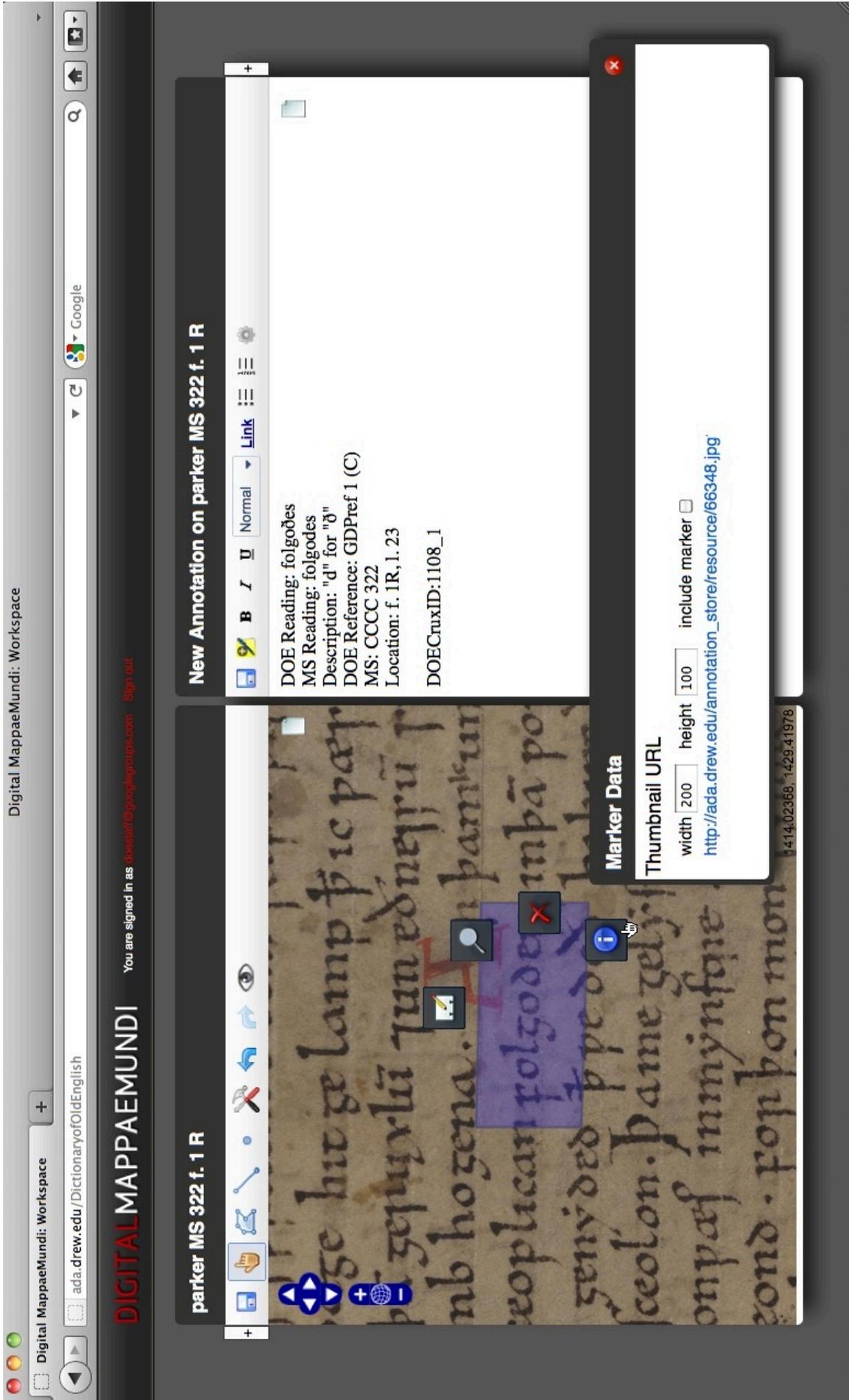


Figure 2: *Dictionary of Old English, Palaeographical Cruxes in Old English Manuscripts* project. Here a specific textual crux is targeted from a manuscript folio in the Parker on the Web repository, and related to a textual annotation containing metadata for the crux. The “Marker Data” dialog box has been opened to generate an independent thumbnail with its own stable URL, for use the Dictionary of Old English’s image database.



Figure 3: *La Chronique Anonyme Universelle* project. Editor Lisa Fagin Davis with the fifty-foot genealogical scroll. Davis is using DM to create a linked environment of all historical content on the scroll (see below).

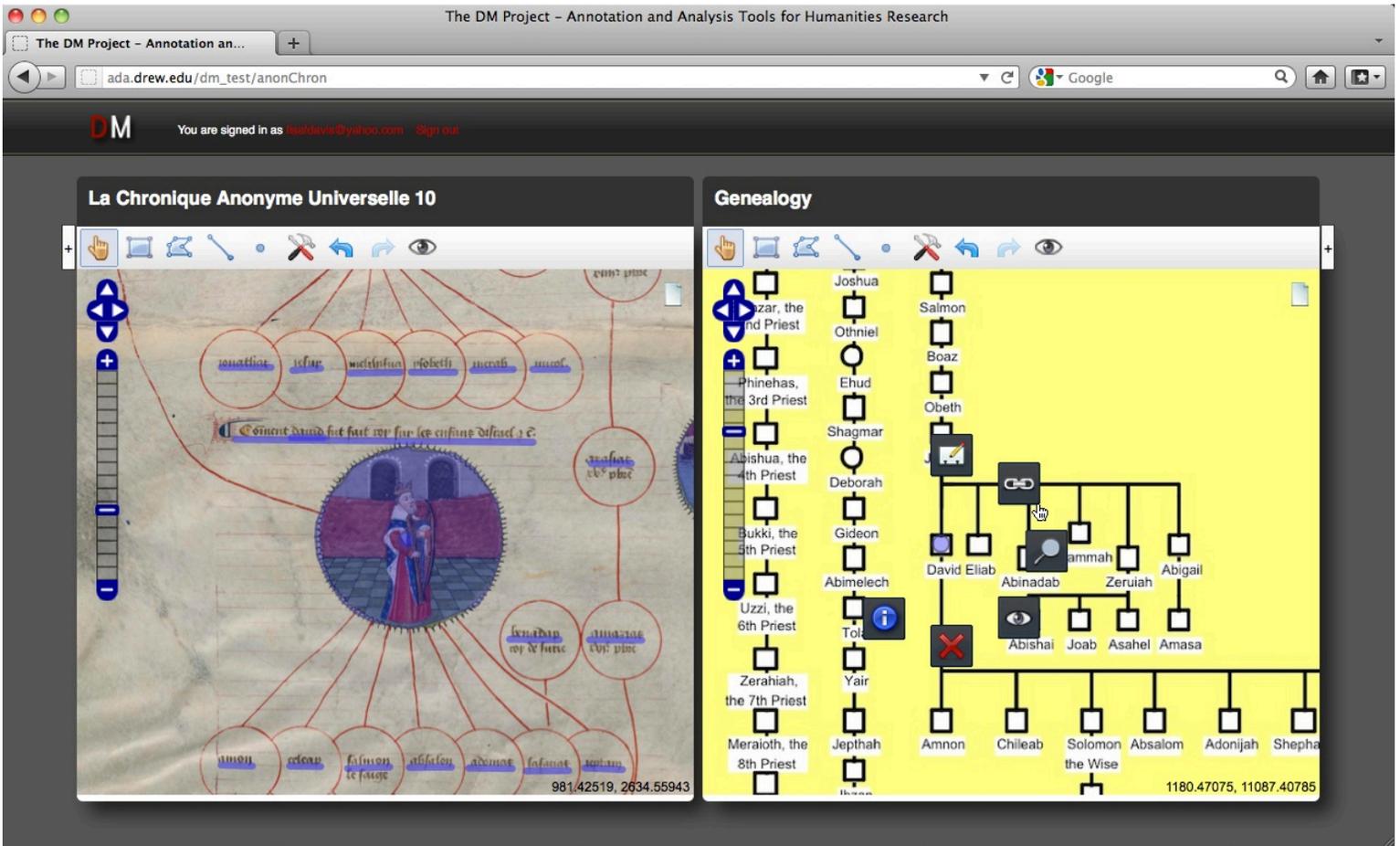


Figure 4: *La Chronique Anonyme Universelle* project. As part of a full digital edition, editor Davis has used genealogy software to create a chart of the 1500 figures in the scroll. Image of chart has been uploaded for use as a visual index, and items on it are being selected with [image ← → image] linking related to specific targets on the actual scroll. Davis is then also creating textual annotations for all figures on the scroll, as well as linking them to targets in a transcription and translation of the accompanying medieval French history.

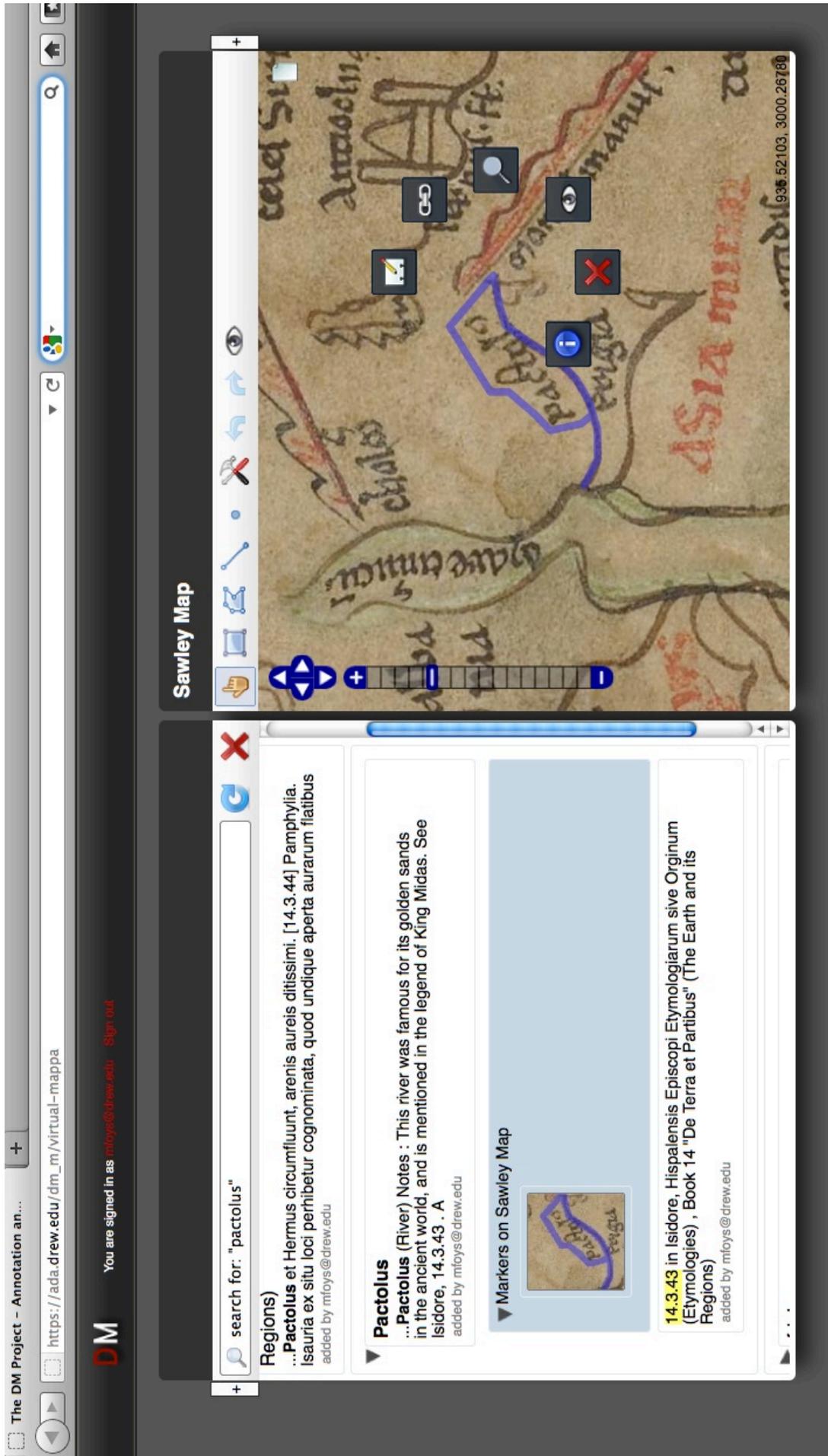


Figure 5: *Virtual Mappa Project*. Here the search window reveals DM environment data (texts, annotations and related image targets) linked to the term “Pactolus.” The first item in the left frame (partially obscured) is a link to this term as found in a text document (section 14.3.43 of Isidore) contained in the DM environment. In the second item, the textual annotation for the concept “Pactolus” has been twisted down, revealing image and textual links embedded in it. Here we see a thumbnail of the image target (displayed also in full on the right), which uses the line selection tool to trace the route of the river and frame the accompanying inscription. The second embedded link (just below the thumbnail) shows a link to a target in a text document (again, section 14.3.43 of Isidore) contained within this annotation.

https://ada.drew.edu/dm_m/virtual-mappa

You are signed in as edg@ada.drew.edu Sign out

DM

Mons Ardens (Burning Mountain)

Maps:

- **Cotton Map** (*hic dicitur esse mons super (super) ardens*) The Cotton Map has a small, two-tiered, small mountain, uncolored, with a small concavity at the top in the south-east corner of the map.
- **Sawley Map** (*m. ardens*) The Sawley Map has a similar figure, colored in a red wash, likewise in the southeast corner.

Notes: Orosius and Isidore make no mention of such a mountain. This feature might derive from Solinus, who lists a similar mountain on the south coast of Ethiopia: *A media parte mons editus mari imminet, ingenue igni per aeternum feruidus et in quiete iugis flagrantibus; inter quae incendia iugis aestus draconum magna copia est* (30.14-15, [Monumenta.ch](http://monumenta.ch)).

Like Sawley and Cotton, the Hereford map has a similar mountain in the eastern location, but also duplicates it in the middle south-western edge, perhaps following with Pliny's note in his *Natural History* of a mountain like this named Theon Ochema in the "middle" of the Ethiopian coast: *a media eius parte imminens mari mons excelsus aeternis ardet ignibus, Theon Ochema dictus Graecis* (6.35.197, [Monumenta.ch](http://monumenta.ch)); "and in the midst of these regions there is a mountain of immense height, which overhanes

Go to link: http://monumenta.ch/late.../ther_codices=&no_trace=1 - Change - Remove

Cotton Map

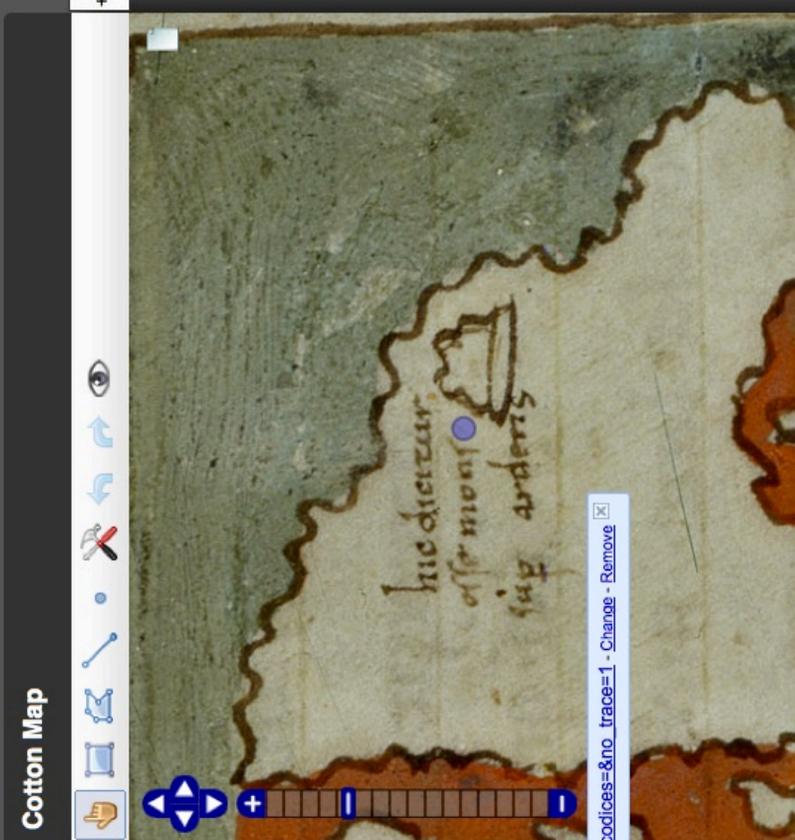


Figure 6: *Virtual Mappa Project*. Here a thematic annotation for a feature on medieval maps shows links to related targets on two separate maps (images). One has been opened, taking the user directly to the item in question on the Cotton Map (target indicated by use of the “dot” tool). In the “Notes” section of the annotation, links to web resources *outside* the DM environment may also be seen (here, a link to the *Monumenta.ch* site, which features transcriptions of classical and medieval texts displayed with accompanying manuscript images from *eCodices* repositories.) Clicking on this open the external resource in a new browser tab.

Digital Mappaemundi: Workspace

ada.drew.edu/DigitalOhlgrenProject

DIGITALMAPPAEMUNDI

You are signed in as scottbrown@owensboro.edu Sign out

+London, British Library Cotton MS Nero D.IV

Title: Lindisfarne Gospels (Gospel Book)
Provenance: Lindisfarne; Chester-le-Street; Durham
Date: 7th/8th (Alexander, c. 698 ?)
Size: 340 x 240 mm., ff. 258
 <Alexander no. 9; Lowe vol. II no. 187; Gneuss, no. 343; McGurk, no. 22; Ker, no. 165>
Facsimile: T. D. Kendrick, et al, *Evangeliorum Quattuor Codex Lindisfarnensis*, 2 vols. (Olten and Lausanne, 1956 and 1960)
 f. 2v
Carpet page: ^{with central, six-part rectilinear cross. According to Henderson (1987, p. 99) are four rectangular ornaments filled with step-patterns: two squares, symbolizing the two angels over the arms of the cross, and two, long thin, symbolizing figures attending the cross. The outer border containing queuing birds and beast heads rest their chins on the four corners.}
 <Alexander, ill. 36; Henderson 1987, pl. 137; Nordenfalk 1977, pl. 15 (in color); Nordenfalk 1957, pl. 116 (in color); Swenson, fig. 1; Backhouse 1981, pl. 19 (in color).>
 f. 3
 Initial page *Novum opus*. Beginning of Gospel preface attributed to St. Isidore. Contains ornamental initial with boat and bird head motifs.

Keyword Index Current

Carpet page: see *Glossary*
 3.1, 6.1, 6.3, 6.11, 6.14, 6.17, 9.1, 9.10, 9.16, 9.21, 9.28, 21.8, 24.14, 44.3, 52.26, 61.3, 61.4, 228.1, 228.3, 228.4. For later examples, see: 58.1, 72.1, 72.13, 72.14.

Cassiodorus: see *Glossary*

Celtic tonsure: see **Tonsure**

Chi-monogram: see *Glossary*.
 1.1, 6.9, 9.12, 11.4, 15.1, 21.3, 23.14, 24.8, 26.10, 30.13, 36.8, 37.5, 39.19, 44.4, 45.3, 48.2, 49.3, 52.27, 53.3, 56.3, 59.1, 70.5, 72.4, 224.21

Chiron
 Son of Kronos and Philyra, Chiron is the medicineman of the Centaurs, a race of monsters having the upper body of a human and the lower body of a horse.
 168.2

Christ
 Adoration of the Magi. . . 65.7, 111.10, 177.4, 189.29
 adored by St. Dunstan. . . 89.1
 adored by Peter and Paul. . . 161.6

Find: carpet Highlight all Previous Next Match case

Figure 7: *Insular and Anglo-Saxon Illuminated Manuscripts: An Iconographic Database*. Here the DM resource is being used as a purely textual environment, to create linked data for what was previously a static print catalog of 229 manuscripts containing Anglo-Saxon illumination and cross-referenced themes. On the radial menu visible, the “link” icon is being used to create a link between the highlighted term in an entry for an illumination in a specific manuscript, and the corresponding term in a keyword index. Once the textual work on this project is completed, images of illuminations accessible through digital repositories will begin to be added.

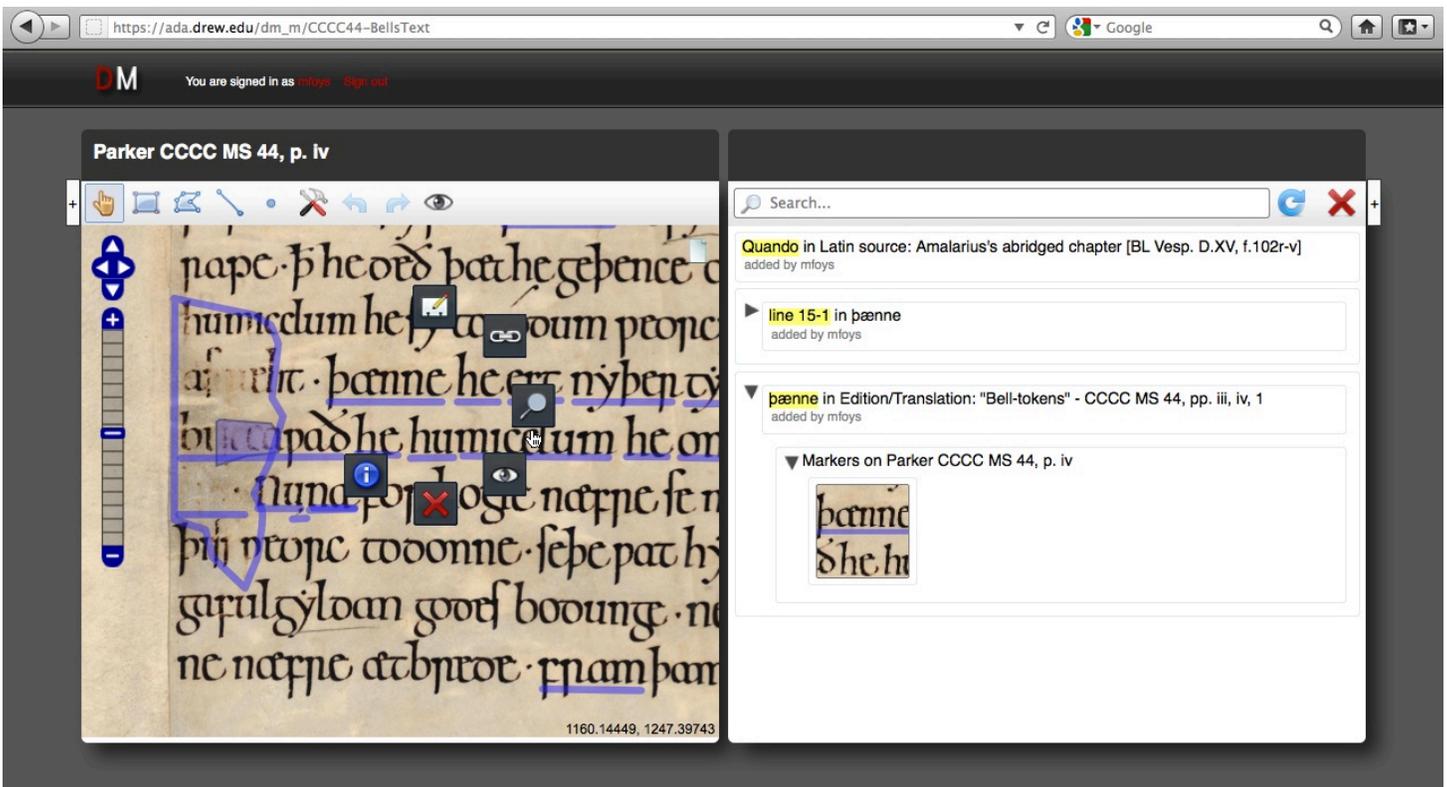


Figure 8: MS CCCC 44, Bell-Tokens treatise (personal project). Here the DM resource has been used to link multiple items to the same target selection on an image. The target selection for the Old English word “thænne” has been clicked on, and the magnifying glass selected to display all items linked to this target. This linked data displays in the right frame, and three associated items are evident: a link to a word (“Quando”) in a transcription of the Latin source text (which “thænne” translates), a link to an indexing of “thænne” at this location in a glossary entry for the term (see *Figure 9* to see this annotation), and finally a link to this term as it occurs in a diplomatic edition of the treatise being edited.

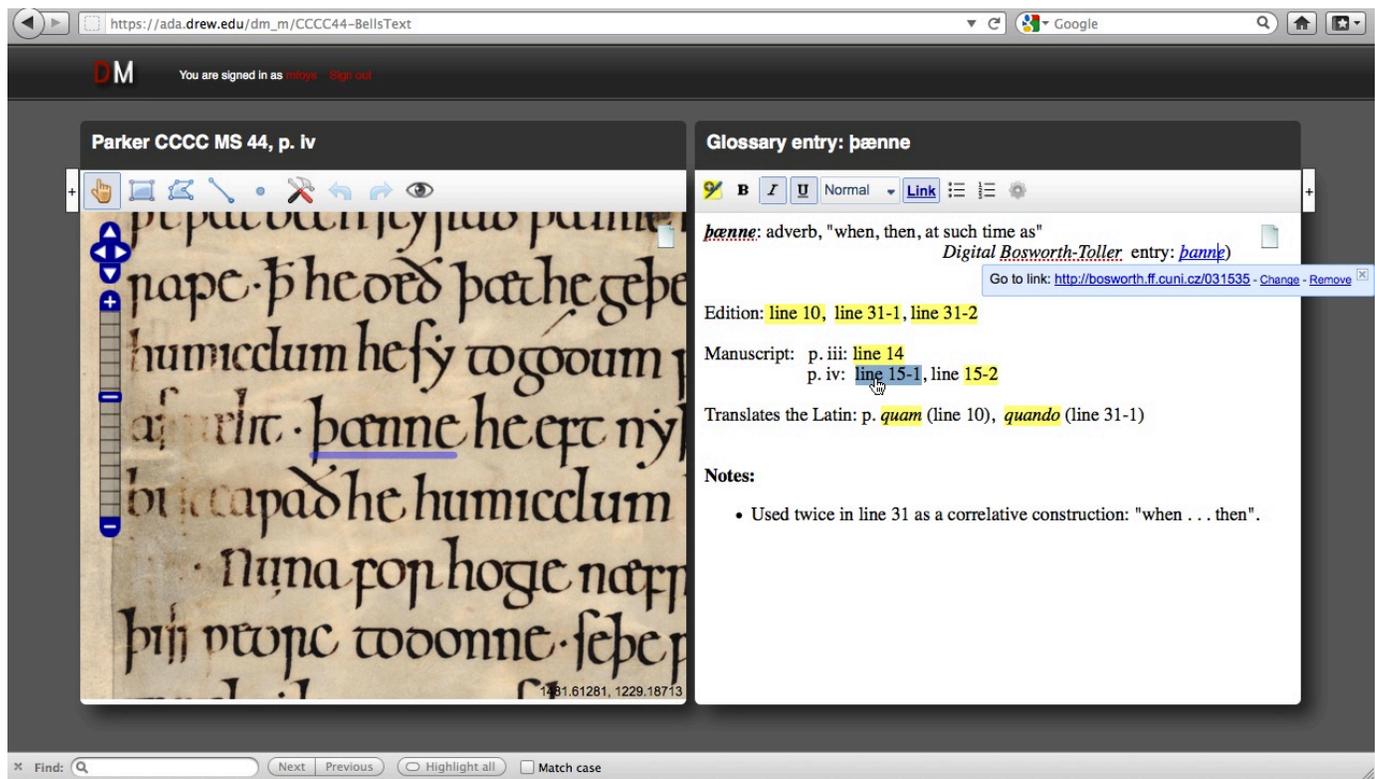


Figure 9: See *figure 8*, above. Here the glossary entry for the word “thænne” is displayed, showing links to multiple targets on the folia containing the edited text. One link has been selected, opening the folio in question and showing the selection (made with the line tool) of the word. Note also the link pointing to the external web resource in the entry in the *Digital Bosworth Toller Dictionary* resource (made with the “Link” button in the toolbar immediately above). Clicking on this opens the external resource in a new browser tab.