

Annotated Bibliography, and Summaries

I. Annotating Text

II. Annotating Media

III. Annotation Theory and Practice

IV. Group Dynamics and Social Annotation

V. Bibliographic Reference/Metadata/Tagging

Note to Reader: The categories of this bibliography have been separated into 'Tools' and 'Articles' for ease of reading. Cross-posted entries have been marked with an asterisk () after their first appearance.*

Category I: Annotating Text

This category provides an environmental scan of the current state of text-based annotation practices and the foundational tools in the discipline. Many of the publications focus on situating annotation in the field of digital humanities by drafting definitions for annotation practice; specifying a general annotation framework for commentary across mediums; or brainstorming platforms that would better support user interaction with objects and with each other. Authors remark that the evolution of scholarship brought about by interactive Web 2.0 practices shifted the focus from learner-content interaction to learner-learner interaction, and that this behavioural shift necessitates a redesign of tools (Agosti et al. 2005; Gao 2013). It is widely acknowledged that annotation practices are beneficial for learning, archiving, clarifying, sharing, and expanding; current Web architecture, however, struggles to facilitate these advantages (Agosti et al. 2012; Bottoni 2003; Farzan et al. 2008). Several publications introduce tools that bridge the gap between tool design and user needs, specifically AnnotatEd and CommentPress (Farzan et al. 2008; Fitzpatrick 2007). These tools, along with alternative platforms that gamify annotation, allow for interactive reading and support user engagement with resources in a customizable way. The tools treat documents as mutable objects that can be tagged, highlighted, and underlined. Many of the tools in this category, such as Annotary and Annotea, facilitate bookmarking and the organization of documents thereby making searching and browsing through the data easier and more efficient. All of these tools included are free to use, with the majority being online and open access. Notably, this allows users to share their own data and have access to each other's annotations, which promotes collaboration.

Articles

Agosti, Maristella, Nicola Ferro, Ingo Frommholz, and Ulrich Thiel. 'Annotations in digital libraries and collaboratories — facets, models and sage.' *Proceedings of the 8th Conference on Research and Advanced Technology for Digital Libraries*. Rachel Heery and Liz Lyon, eds. (Berlin, 2004), 244–55. Web. 6 May 2016.

Agosti, Ferro, Frommholz, and Thiel discuss beneficial annotation practices across the fields of digital libraries and collaboratories. The authors attempt to draw connections between the objectives of digital libraries and the outcomes of annotation practice. They argue that annotations expand the information resources managed by libraries, and support community

access and engagement with resources in a personalised way. The authors categorically define annotations from three different standpoints: annotations as metadata, annotations as content, and annotations as dialogue acts. Agosti et al. propose an Entity-Relationship schema for modeling annotations based on the highlighted properties of this scholarly engagement.

Agosti, Maristella, Hanne Alberchtsen, Nicola Ferro, Ingo Frommholz, Preben Hansen, Nicola Orio, Emanuele Panizzi, Annelise Mark Pejtersen, and Ulrich Thiel. 'DiLAS: a digital annotation service.' *Proceedings of Annotation for Collaboration -- a Workshop on Annotation Models, Tools and Practices*, (2005), n.p. Web. 6 May 2016.

Agosti, Alberchtsen, Ferro, Frommholz, Hansen, Orio, Panizzi, Pejtersen, and Thiel explore how to incorporate annotations in digital libraries and laboratories in order to inform the designing of a service that can facilitate annotation in this discipline. Agosti et al. designed and administered a usability study in order to inform their tool design. As the authors discuss, the objective of this study was to collect data on potential expert users, and their needs, practices, workflows, and goals. Agosti et al. found that the study participants collaborated more often than they anticipated—in fact, participants collaborated on nearly every task they performed. Annotation tools were used to track project progress and were attached to a range of media types. These results inspired the research team to enhance social infrastructure and user interaction through their annotation tool. In the balance of the article, the authors detail the various features, design, and evaluation of the tool, based on user needs and participation.

Bauer, Matthias, and Angela Zirker. 'Whipping boys explained: literary annotation and digital humanities.' *Literary Studies in the Digital Age: An Evolving Anthology*. Raymond G. Siemens, Ken Price, Dene Grigar, and Elizabeth Lorang, eds. (New York, 2016), n.p. Web. 8 May 2017.

Bauer and Zirker discuss the purpose of annotation, evaluate the effectiveness of current annotation methods, and provide a list of best practices for moving forward. They argue that commentary has almost always been a part of reading, but the problems of annotation are rarely addressed or theorized. They argue that annotation is intimately tied to medium and cognition, and that our annotation system should be revised reflect the individual needs of a reader. Further to this, the authors share a project started in 2011 at the University of Tübingen that focuses on audience and annotation by creating a commentary schema that presents relevant information to the reader in the form linguistic, formal, intratextual, intertextual, contextual, or interpretive annotation.

Belanger, Marie-Eve. 'Annotations and the digital humanities research cycle: implications for personal information management.' *IDEALS @ Illinois: Digital Environment for Access to Learning and Scholarship*, (2010), n.p. Web. 6 May 2016.

Belanger explores the issues emerging from scholars whose work oscillates between digital and print mediums. Specifically, she focuses on the effect this has on their personal information management practices. Belanger argues that many scholars work in a hybrid information space where they are in contact with multiple formats across their research endeavours. This approach plays into the researcher's personal information management practices: how they create, store, organise, maintain, retrieve, and distribute information. Belanger hones in on one personal information management practice: annotation. She argues that printing digital documents for reading and annotating purposes is an imbalanced, dual-medium approach because it requires

shifting between media instead of concentrating on one.

Benjamins, V.R., J. Contreras, M. Blazquez, M. Nino, A. Garcia, E. Navas, J. Rodriguez, C. Wert, R. Millan, and J.M. Dodero. 'ONTO-H: a collaborative semiautomatic annotations tool.' *8th International Protege Conference Collaborative Development of Ontologies and Applications*, (2005), 69–72. Web. 6 May 2016.

Benjamins, Contrera, Blazquez, Nino, Garcia, Navas, Rodriguez, Wert, Milla, and Dodero present an ontology for humanities research and a corresponding tool that utilises this ontology to produce semi-automatic annotations. The authors begin by foregrounding the information overload problem that researchers of this century face, as opposed to the relative scarceness of information of a few decades ago. The tool discussed in this article facilitates manual, tool-assisted, and fully automatic annotation using the humanities ontology. The authors recognise that manual annotation efforts are considered a necessary task of humanities research but they argue that semi-automatic annotation tools offer some significant improvements. The authors conclude by discussing the migration of the tool to a collaborative environment in order to promote user-oriented, shared annotation.

Bottoni, Paolo, Stefano Levialdi, and Paolo Rizzo. 'An analysis and case study of digital annotation.' *Databases in Networked Information Systems*, (Berlin, 2003), 216–31.

Bottoni, Levialdi, and Rizzo characterise annotation as a specific interaction with a digital object. The authors argue that annotation aids in remembering, clarifying, and sharing information pertinent to an object of inquiry. Because there is no agreement on a commonplace definition of digital annotation, Bottoni, Levialdi, and Rizzo suggest that digital annotation can be understood as a digital object attached to another object. They use the metaphor of a nucleus and a satellite to illustrate the relationship between an object and its annotation. The authors also develop an algebraic definition of digital annotation and take up the User-Centered Annotation Tool as a case study to further specify the details of their definition.

Chamberlain, Jon, Massimo Poesio, and Udo Kruschwitz. 'Phrase Detectives: a web-based collaborative annotation game.' *Proceedings of the International Conference on Semantic Systems*, (2008), 42–9. Web. 6 May 2016.

Chamberlain, Poesio, and Kruschwitz discuss the development of an online game platform to aid in the annotation of texts. The authors point out that the greatest obstacle for automatic, computational extraction of semantic information is having an annotated corpus large enough to train a machine for this task. Their project, ANAWIKI, experiments with an innovative approach to large-scale corpus annotation by using a game-like interface in order to engage users. The game, *Phrase Detectives*, is designed to teach non-expert users how to annotate text. The objective of the game is for the user to identify relationships between short words and phrases. The game uses a detective genre to motivate engagement and is linked to social media platforms, like Facebook, to increase accessibility.

Cohen, Daniel J. 'Creating scholarly tools and resources for the digital ecosystem: building connections in the Zotero Project.' *First Monday*, 13.8 (2008), n.p. Web. 27 May 2016.

Cohen details how the Zotero project exemplifies both Web 2.0 and traditional scholarly ethos. Cohen conceptualises Zotero as a node in an interconnected digital ecosystem that builds bridges instead of hordes information. Zotero is a widely used, open source, community based bibliography tool. It exists on top of the browser as an extension, has maintained an API since its

inception, and boasts comprehensive user features. As an easy to use collaborative tool, Zotero acts as both an effective scholarly resource and a facilitator of social knowledge creation.

Decurtins, Corsin, Moira Norrie, and Beat Signer. 'Digital annotation of printed documents.' *Proceeding of the Twelfth International Conference on Information and Knowledge Management*, (2003), 552–5. Web. 27 May 2016.

Decurtins, Norrie, and Signer's goal is to develop a general annotation framework that can support annotations across media. Decurtins, Norrie, and Signer argue that annotation may be private, public, permanent, transient, formal or informal. Furthermore, annotation tools are only designed to support a single form of annotation but most users annotate across a variety of forms, which reveals a disconnect between tool design and user needs. The authors assert that the integration of print and digital materials can be facilitated through special reader devices that bridge the gap between media forms. Showcased through a brief case study, Decurtins, Norrie, and Signer propose an annotation framework that dynamically maps documents and their information. To conclude, the authors admit that while this annotation model helps further the prospects of cross-media annotation, implementation is limited because it is tied to the development of new reader technologies.

Dingli, Alexiei. 'Annotating different media.' *Knowledge Annotation: Making Implicit Knowledge Explicit*, (Berlin, 2011). Web. 6 May 2016.

Dingli captures and engages deeply with a wide spectrum of annotation theory, practices, and aspects. He asserts the benefit of shared human computation in tackling large projects by pointing to a number of successful collaborative practices, and demonstrates that even manual annotations are enhanced by Web 2.0 technologies. In fact, one chapter is dedicated to manual annotation, where Dingli discusses various related issues, including creator subjectivity and privacy policies. He argues that in order to support the web of the future, there needs to be a shift towards the semantic web, which can offer solutions for the retrieval and use of information. Dingli asserts that many of the concepts and the technologies needed to actualise the semantic web are in place, such as the XML standards, the Resource Description Framework (RDF) and the Web Ontology Language (OWL). Dingli also discusses semi-automated and automated annotations, where he analyzes various tools, systems, and algorithms to showcase the possibilities that arise from these practices and to point to their limitations. He argues that the redundancy of information on the web, when approached appropriately, can in fact work for the purposes of quality control since the data is gathered from a rich source of varied users with a diverse skillset, and that exploiting the redundancy of web information can result in interesting outcomes.

Farzan, Rosta, and Peter Brusilovsky. 'AnnotatEd: a social navigation and annotation service for web-based educational resources.' *New Review of Hypermedia and Multimedia*, 14.1 (2008), 3 –23. Web. 6 May 2016.

Farzan and Brusilovsky argue that although annotation is proven to be a beneficial practice, it is not supported by the current Web architecture. Despite being the most popular hypertext system, the World Wide Web is not the most powerful or advanced. Farzan and Brusilovsky discuss integrating and enhancing the Web's capabilities through the introduction of content annotation and adaptive navigation support. They introduce the AnnotatEd system, which combines both annotation (through highlighting and free-text comments) and adaptive navigation support

(through social navigation) into one platform. AnnotatEd visualises user traffic and user-contributed annotations on its central interface. Farzan and Brusilovsky share details of the transformations and improvements the platform has undergone since its inception. Overall, the authors relied on user-collected data to guide their development on the application.

Ferro, Nicola, Gary Munnely, Cormac Hampson, and Owen Conlan. 'Fostering interaction with cultural heritage material via annotations: the FAST-CAT way.' *Bridging Between Cultural Heritage Institutions*. (Berlin, 2014). Web. 27 May 2016.

The Flexible Annotation Semantic Tool - Content Annotation Tool (FAST-CAT) is a system for annotating digital content, where FAST refers to the backend that provides annotation functionalities and the CAT is the front end Web annotation tool. Ferro, Hampson, and Conlan argue that most tools are designed to work within a single format and those that go beyond often have limited features. The model proposed in this article treats an annotation as a multimedia object that can materialise in the form of different signs—such as text or image—and these signs can carry various semantic meanings and formats. It supports a search mode that is optimal for both structured and unstructured content, and the annotations can be public, private, or shared. FAST-CAT is part of the CULTURA project, which develops personalised access and data presentation and retrieval in two historical collections in a digital humanities context. The future aim of the project is to expand from text and image annotation to other multimedia types in order to expand the scope of its use.

Fitzpatrick, Kathleen. 'CommentPress: new (social) structures for new (networked) texts.' *The Journal of Electronic Publishing*, 10.3 (2007), n.p. Web. 6 May 2016.

Fitzpatrick discusses CommentPress, a theme for WordPress that supports web publication and user comments. Fitzpatrick argues that many of the new text reproduction systems attempt to recreate the linear structure of a printed book in a digital environment. She sees this design choice as unhelpful and limiting, as it removes the possibility for a fully networked, participatory, online reading environment afforded to scholars in the post-digital turn. Fitzpatrick suggests that academics' unwillingness to embrace change in interface design may be because we feel lost in the new multimedia world. The movement towards a connected reading environment is critical for embracing an un-isolated nature of reading, and Fitzpatrick argues that CommentPress facilitates this interactive style of reading by allowing readers to comment on 'chunks' of text and connect them in different ways. Further, she asserts, CommentPress responds to an understanding that a book is not simply words on a screen, but rather a mode of engagement.

Gao, Fei. 'A case study of using a social annotation tool to support collaboratively learning.' *The Internet and Higher Education*, 17 (2013), 76–83.

Gao explores how students learn collaboratively using the Web 2.0 social annotation tool Diigo. Gao argues that there has been a recent shift in focus from learner-content interaction to learner-learner interaction. Computer-supported collaborative learning focuses on facilitating peer interaction and group work through technology. Social annotation practices allow users to create text-level commentary that can be shared with a group. Gao asserts that while it is assumed that social annotation tools could be used for learning, rigorous research on their effectiveness is limited. The author's case study surveyed 33 participants and found that the students were highly motivated in using the social annotation tool, likely because they perceived its support of their learning.

Johnson, Martin, and Rita Nadas. 'Marginalised behaviour: digital annotations, spatial encoding and the implications for reading comprehension.' *Learning, Media and Technology*, 34.4 (2009), 323–36. Web. 6 May 2016.

Johnson and Nadas consider how readers' annotation practices can be affected by mode, memory, and comprehension. The authors present a literature review, including research on reading on screen versus reading on paper, to foreground their later investigation on whether or not readers' annotations are affected by using different mediums. Johnson and Nadas found that the spatial encoding afforded by paper was more efficient; adding that annotating on paper is more of an unconscious act, with minor cognitive effort required. The authors conclude that spatial awareness is less available when reading on screen and that screen annotation should be designed to replicate annotation on paper in order to be effective.

Mahlow, Cerstin, Christian Grun, Alexander Holupirek, and Marc H. Scholl. 'A framework for retrieval and annotation in digital humanities using Xquery full text and update in BaseX.' *Proceedings of the 2012 ACM Symposium on Document Engineering*, (New York, 2012), 195–204. Web. 6 May 2016.

Mahlow, Grun, Holupirek, and Scholl present a framework that supports both time retrieval and annotation of linguistic structures. As a corpus, the authors explore a TEI document collection of German texts dating from 1650 to present. They explain the interest of the digital humanities in annotation and XML, discussing methods such as automatic annotation of linguistic information and suggesting that additional information should be added to the XML-annotated digital humanities corpus data. After presenting the BaseX architecture, Mahlow et al. explain XQuery and its extensions through a case study in which they retrieve and annotate idiomatic phrases. They conclude that XQuery Full Text and Update have the capabilities that allow linguistic exploration of heterogeneous documents.

Marshall, Catherine C. 'Annotation: from paper books to the digital library.' *Proceedings of the Second ACM International Conference on Digital Libraries*, (New York, 1997), 131–40.

Marshall studies the value, function, and implication of personal annotations. Her study of annotations in print books acknowledges several issues and design implications for annotation tools. The author elaborates on her methods, as well as why studying the annotations available in used university books is beneficial and more relevant than other forms of annotations. Marshall classifies her findings in terms of form and function, arguing that the former answers how to mark digital material and the latter addresses the roles of annotation in a digital library setting. Based on her findings, she suggests a set of design implications like fluidity of form in informal codings. She concludes that people are more likely to continue annotating print material until tool designers provide the best digital alternative.

Paradis, Jim, Kurt Fendt, Wyn Kelley, Jamie Folsom, Julia Pankow, Elyse Graham, and Lakshmi Subbaraj. 'Annotation Studio: brining a time-honoured learning practice into the digital age.' *Comparative Media Studies and Writing*, (27 July 2013), n.p. Web. 6 May 2016.

Paradis, Fendt, Kelley, Folsom, Pankow, Graham, and Subbaraj present a paper on Annotation Studio, a tool developed by HyperStudio at MIT. They argue that this tool encourages students to become more active readers, by uniting reading and annotating as shared process. The authors discuss the tool's historical and conceptual context, pointing to qualities that distinguish Annotation Studio from other tools, and their plans for future development. They suggest that co-

design practices, open-source development processes, and classroom orientation outcomes are of those important qualities. Paradis et al. note that their list of future features is based on focus group sessions and student critiques, along with meetings with instructors, evincing that they are developing a tool users can rely on. The authors conclude by highlighting the core strengths of the tool: flexibility, simplicity, and responsiveness.

Stein, Bob. 'Back to the future.' *Journal of Electronic Publishing*, 18.2 (2015), n.p. Web. 6 May 2016.

Stein briefly discusses the historicity of annotations by studying annotations from the 11th century. He considers how technology could (and does) emphasise the importance of annotation through the Networked Books project. In Networked Books, the document author and readers engage in a more equal, or democratic, way. The success of this project led Stein and colleagues to create a commercial product called SocialBook. SocialBook has been praised as a method to enhance both individual and collective understanding of the texts studied, also motivating students to work harder on their tasks. Stein predicts that the future of creative expression will be centered around gaming, which calls for print culture to be enhanced in the realms of digital technology.

Su, Addison Y.S., Stephen J.H. Yang, Wu-Yuin Hwang, and Jia Zhang. 'A Web 2.0-based collaborative annotation system for enhancing knowledge sharing in collaborative learning environments.' *Computers and Educations*, 55.2 (2010), 752–66. Web. 6 May 2016.

Su, Yang, Hwang, and Zhang investigate how students have used Personalized Annotation Management System (PAMS) 2.0 (a Web 2.0 collaborative annotation system), for sharing their own annotations in a collaborative learning context. They conduct a quasi-experiment, analyze the results, and then discuss how PAMS 2.0 was built, followed by a description of the methodology, and the results and findings. The authors find that annotation systems help enhance student learning outcomes. Sharing activities have positively affected students' achievement, and have increased collaboration, at least among more motivated students. They conclude that learning achievements are influenced by the quantity of annotations, and that further research needs to be conducted in order to explore factors that could influence instructional tools.

Visconti, Amanda. 'Infinite Ulysses: mechanisms for a participatory edition.' *Editing Modernism in Canada*, 4 (November 2013), n.p. Web. 6 May 2016.

Visconti, in her blog post on 'Infinite Ulysses: Mechanisms for a Participatory Edition,' explains new features she will be adding to her digital edition of James Joyce's novel *Ulysses* in order to enhance it by creating a more participatory platform. Visconti explains how she will set up the website in a way that encourages collaboration amongst users. Aside from annotating edited texts, the digital version of *Ulysses* allows users to tag their annotations, filter them by tags or user accounts, assign weights to annotations (the user's and others'), go through less visible editorial contributions, include the possibility to specifically work with contentious annotations, and save annotations (both private and public). The author discusses her development of the wireframe prototype and future possibilities for the live site. She concludes with the practical usages of this website, suggesting that it can satisfy the needs of different types of users with various purposes.

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Visconti explains how tech tutorials and documentations enhance inline annotation, encouraging digital humanists to annotate such web pages, along with others, using #DHannotates. She offers instructions on how to use Hypothes.is in a step-by-step instruction form, among other lessons. Visconti concludes by linking readers to a conversation on using Hypothes.is annotation for the purpose of improving programming tutorials.

Walsh, Brandon, Claire Maiers, Gwen Nelly, Jeremy Boggs, and Praxis Program Team. 'Crowdsourcing individual interpretations: between microtasking and multitasking.' *Digital Scholarship in the Humanities* formerly *Literary and Linguistic Computing*, 29.3 (2014), 379–86.

Walsh et al. track the creation of Prism, an individual text markup tool developed by the Praxis Program at the University of Virginia. Prism was conceived in response to Jerome McGann's call for textual markup tools that foreground subjectivity. The tool illustrates how different groups of readers engage with a text. Prism is designed to assist with projects that blend two approaches to crowdsourcing (microtasking and macrotasking). The most compelling quality of Prism is that it balances the constraint necessary for generating productive metadata with the flexibility necessary for facilitating social, negotiable interactions with the textual object. In that way, Prism redefines crowdsourcing in the digital humanities.

Tools

Altmann, Gerry, Richard Buck, and Tim Page. *TagNotate*. n.d. Tim and Gerry Inc. Web. 22 February 2016. <<http://www.tagnotate.com>>.

With TagNotate, users can read and annotate PDF documents. This tool facilitates searching notes across documents. Users can annotate by highlighting, writing notes, and drawing. They can also tag, sort, and search their annotations according to personalised categories. This tool is best suited for users who read digital documents and annotate on screen. TagNotate reaches out to scholars from various fields, including science, medicine, designers, and art historians, who could benefit from its diverse features that facilitate project management and organization.

AnnotateIt/Annotator. 7 November 2015. Open Knowledge Foundation. Web. 22 February 2016. <<http://annotateit.org>>.

AnnotateIt is a user-friendly web annotator system that comprises the JavaScript tool Annotator, and a bookmarklet that supports the annotation of any website. It facilitates social knowledge creation through continuous collaborative annotation. The user can tag annotations, markdown content, and personalise access permission. The Open Knowledge Foundation designed Annotator to be easily extendable in order to potentially include more features. Of note, the Open Knowledge Foundation has developed many social knowledge creation tools, including: BibServer (<http://bibserver.org>), CKAN (<http://ckan.org/>), and TEXTUS (<http://textusproject.org/>).

Annotation Studio Team. *Annotation Studio*. Version 2.1.0. MIT Hyperstudio. Web. 25 May 2016. <<http://www.annotationstudio.org/>>.

Annotation Studio is a set of web-based collaborative annotation tools. With Annotation Studio, users can read, annotate, and share documents. It allows users to organise annotated documents, making document collections easy to search. Users can also compose their own documents and refer to Annotation Studio to brainstorm, write, and review. As evinced by its straightforward design, this suite of tools is well suited for pedagogical purposes, but can also be used outside of the classroom. For example, this tool has been used for close reading, public digital humanities, creative writing.

Annotary. 10 September 2012. Annotary, Inc. Web. 6 May 2016. <<https://annotary.com>>. Annotary is a Google Chrome extension that allows users to save web pages, highlight sentences and paragraphs, take notes, and share their annotations with other users. Annotary uses a bookmarking feature which facilitates the categorization of online resources into appropriate collections. It is a free tool that supports an unlimited number of bookmarks and annotations. Annotary also supports collaboration by allowing users to browse and contribute to each other's collections. With Annotary, users can enhance their project management capabilities, as well as their analyses, as it provides them with the necessary tools and options.

Annotea Team. *Annotea*. 31 October 2005. W3C. Web. 25 May 2016. <<https://www.w3.org/2001/Annotea/>>.

Annotea is a web-based project that enhances collaboration by allowing users to share metadata, annotations, and bookmarks. Annotations associated with a given document can be downloaded off of various servers, giving individuals access to other users' annotations as well as their own. With Annotea, users can use bookmarks to organise the documents according to topics. This tool is open access and contributes to the semantic web through the Resource Description Framework (RDF) annotation schema for describing annotation metadata.

Annotum. 21 October 2015. Solvitor LLC. Web. 22 February 2016. <<http://annotum.org/>>. Annotum is a simple, web-based content authoring tool that facilitates the creation and editing of articles within a system that allows users to submit, review, and publish material. Annotum strives to replicate the simple, rich, open access model of WordPress, and attempts to enhance the system by supporting article review workflows, version comparison, and simultaneous work by multiple authors. Annotum supports exporting to PDF and XML formats. In addition, it enhances scholarly publishing by facilitating referencing, citation, tables, figures, and auto-generation and referencing of CrossRef DOIs.

Axiom. n.d. Axiom Networks Inc. Web. 22 February 2016. <<https://www.axiomnetworks.ca>>. Axiom serves many purposes, such as annotating different types of documents, collaborating on projects, capturing web pages, and labeling annotations. Axiom helps users to organise documents simply by dragging and dropping them into the interface, and supports different formats, including PDF and Microsoft Word documents. It also allows users to import documents from Google Drive and Dropbox. Options include highlighters, pens, and sticky notes. Furthermore, Axiom comes in the form of a Google Chrome plug-in that functions on most computer systems.

BasKet Note Pads. 30 Septemeber 2010. KDE Project. Web. 22 February 2016. <<http://basket.kde.org/>>.

BasKet Note Pads is a multi-purpose note taking application. BasKet Note Pads facilitates the collection of data, the organization of annotations, tagging, data sharing, and the import of notes from other applications. The tool manages different types of information, including lists, links, and pictures. User data can be openly shared or password protected. BasKet Note Pads presents the user with an interface that can serve as a personalised and tailored hub for their online research. The hierarchical display of the tool's options allows the user to navigate through the tasks and features easily.

Bauer, Matthias, Angela Zirker, and Timo Stosser. *Explanatory Annotation: A Research Project in Digital Literary Annotation*. n.d. Web. <<http://www.annotation.es.uni-tuebingen.de>>. 8 May 2017.

Explanatory Annotation is a project out of the University of Tuebingen that focuses on the theory and practice of annotation. Chiefly, the project has three main goals: defining explanatory annotation, developing its theory and disseminating its best practices; investigating the use and influence of explanatory annotation; and establishing explanatory annotation as a field of digital humanities. *Explanatory Annotation* structures and classifies annotations based on a series of categories that describe the purpose and intent of the commentary. These include language, form, context, interpretation, and several others. They have also created a digital environment that displays annotated texts.

Bekerle, Patrizio. *QOwnNotes*. 27 May 2016. Web. 9 May 2016. <<http://www.qownnotes.org/>>. QOwnNotes is an open source note taking tool. It inputs plain-text format, supports markdown, and is available for ownCloud integration. It manages to-do lists and allows synchronizing data with other devices which are primarily saved on the user's own computer. Notes in QOwnNotes can be searched and edited. For to-do list management, ownCloud tasks or task++ is required. QownNotes allows users to restore deleted and removed annotations, and offers the option of encrypting important notes and data.

Bradley, John. *Pliny*. Version 1.1.0. Center for Computing in the Humanities, King's College. Web. 22 February 2016. <<http://pliny.cch.kcl.ac.uk/index.html>>.

Pliny is a desktop application that facilitates note taking and annotating with features that promote evolving personal interpretation. This application was designed for organizing notes and accumulating material for further interpretation. Pliny can manage both off- and online material. Pliny can be installed as a plugin and allows users to build their own tools off of this one; this option is designed to serve for the purpose of enhancing and further developing humanities computing. Of note, information and data are stored on one's personal computer and not online.

CAT: Content Annotation Tool. n.d. Content Insight. Web. 09 May 2016. <<https://dh.fbk.eu/resources/cat-content-annotation-tool>>.

The Content Annotation Tool (CAT) is an open access flexible and customizable web-based text annotation tool. CAT facilitates multi-layer annotation, enabling the user to annotate different elements—such as linguistic and semantic features—separately. The user can also export the content into a standardised XML format that can be easily converted and shared. CAT supports advanced document search and has an option that measures annotator agreements and progress in a collaborative setting. The tool is freely available for research purposes upon request. Some

projects in which it has been implemented so far include the Italian-TimeBank, TERENC, Excitement, NewsReader, and EVENTI.

Call, Luke A. *OneModel*. 8 April 2016. Web. 6 May 2016. <<http://www.onemodel.org/1/e-9223372036854622523.html>>.

OneModel is an open access text-based tool for knowledge organization, file management, collaborative annotation, and import and export of texts. OneModel allows users to take notes, arrange annotations in a hierarchy, link internal commentary, and make personalised lists. Although OneModel does not currently support mobile use, the developers aim to integrate this feature in a future platform update.

Cannon, Robert, and Fred Howell. *Annotate.co*. n.d. Textensor Limited. Web. 22 February 2016. <<https://www.annotate.co/>>.

Annotate.co is the new iteration of A.nnotate, a browser-based tool that allows users to privately or publicly annotate and index document, images, and snapshots of web pages. A.nnotate facilitated document management practices, including reviewing drafts, compiling corrections for revision, and noting passages for future reference. It supports a variety of formats, such as PDF and Microsoft Word files. The new iteration, Annotate.co, has a number of additional features, including more options for user roles and permissions. Annotate.co also introduces parallel review, point to point linking, and the ability to compare different versions of documents, which allows users to make connections to words and phrases across documents.

Crocodoc. n.d. Box. Web. 22 February 2016. <<https://crocodoc.com>>.

Crocodoc is an open source collaborative document annotation tool. Its features include highlighting, striking through, adding comments, and completing other types of revisions. This tool works with PDF files, Microsoft Word documents, images, and other media. Crocodoc has an open API documentation that can be embedded into other applications.

Diigo. n.d. Diigo, Inc. Web. 9 May 2016. <<https://www.diigo.com/>>.

Diigo specifically focuses on enhancing e-reading; it is best conceived of as a platform for collecting and managing research. Diigo enables a variety of online practices from social bookmarking to comprehensive search to multi-user annotation. This tool's strength lies in its double role as a collaborative research platform and a social knowledge sharing site. Users can perform their own research, and use Diigo to manage and facilitate those practices. They can also engage with other users via the built-in social network and repository of shared bookmarks. In this way, Diigo encourages social knowledge by catering to the individual needs of various users and providing an online forum for inter-user interaction.

Disqus. *QuickFox*. 19 November 2014. AddOn. Web. 22 February 2016 <<http://firefox.addon.com/quickfox.html>>.

QuickFox is a Mozilla Firefox add-on for note taking that synchronises with various platforms such as Dropbox and SugarSync. With this tool, a user can insert symbols, print notes, send notes via e-mail, open links in notes in new tabs, and import and export notes to and from Simplenote. QuickFox also supports features from various applications, such as Notepad++ shortcuts.

Dominik, Carsten. *Org-mode*. Version 8.3.4. Rackspace Hosting. Web. 22 February 2016. <<http://orgmode.org/>>.

Org-mode is a tool that supports note taking, creating to-do lists, project planning, and writing documents in plain text. It uses literate programming as its language. Org-mode tool allows users to edit, make agendas, export documents, and make tables. The tool is best suited for users who want to handle several organizational tasks in one place.

Duncombe, Stephen, and Thomas More. *Open Utopia*. 5 December 2012. Web. 16 June 2017. <<http://www.theopenutopia.org>>.

Open Utopia is an open edition of Thomas More's 1516 text *Utopia*. Developed by Stephen Duncombe, *Open Utopia* allows readers to interact with the text on a variety of levels: reading, listening, copying, gaming, and annotating. Partnering with The Institute for the Future of the Book, *Open Utopia* hosts a social edition of the text where readers can annotate and share their thoughts on the work, and engage with what other readers have commented. This social edition also preserves the marginal notes from the original 1516 edition, added by More and his friends. These remarks have often been excluded from scholarly editions, but Duncombe revives the editorial tradition by including them in his social edition.

eLaborate. 11 March 2016. Huygens ING- KNAW. Web. 27 May 2016. <<http://elaborate.huygens.knaw.nl/>>.

eLaborate is an online work environment that allows users to upload scanned documents, and transcribe and annotate texts. Users can also publish the annotated transcription of their work online in text form and make it available for other users. This creates a collaborative, user-generated database of text transcriptions and commentary. eLaborate supports both scholarly and personal use of their tool and hosts work environments to cater to the needs of both user groups.

Eliot, T.S., and Touch Press. *The Waste Land for iPad*. 2011. Web. 11 September 2012. *The Waste Land for iPad* is an iPad application edition of T.S. Eliot's notorious 1922 poem, *The Waste Land*. This application was developed by Touch Press in collaboration with Faber and Faber, and released in June 2011. *The Waste Land for iPad* showcases Eliot's poem alongside a collection of features intended to ease comprehension and encourage interaction, including recorded and filmed readings, annotations, and related images.

Frytsky, Volodymyr, and Nadia Frytska. *AllMyNotes Organizer*. n.d. Vladonai Software. Web. 22 February 2016. <<http://allmynotes.vladonai.com/>>.

AllMyNotes Organizer is a tool that stores documents and notes in the form of hierarchical trees in one place, making it easier to browse by topic. This tool also runs on other external drives, therefore not necessarily requiring PC installation. It could be used for several purposes such as project management, password management, and contact management. AllMyNotes is a safe platform wherein a user can assign passwords to files. In addition to that, it features instant search and allows exporting documents to various formats including RichText and HTML. This tool aims at users who are interested in keeping their notes, event organiser, and passwords in one digital place.

Genius. n.d. Genius Media Group Inc. Web. 22 February 2016. <<http://genius.com/>>.

Genius is a tool that facilitates the annotation of websites through a Google Chrome extension and can be integrated into the user's own website. This tool also allows sharing annotated pages with others without the use of extensions, simply by adding genius.it/ before the website's URL. Its main purpose is annotating song lyrics in different formats such as comments and GIFs. Genius grants IQ points to contributors, which unlocks 'privileges' and ranks them as 'Top Scholars' on specific artists.

Glass, Geof. *Marginalia*. 7 October 2015. Web. 27 May 2015. <<http://webmarginalia.net/>>. Marginalia is an open source Javascript web annotation system that allows users to highlight text and write notes. It is primarily designed with education, collaboration, and online discussion in mind, but could be easily adapted for individual annotation practices. As a web annotation system, Marginalia integrates with learning management systems like Moodle. The website on which the tool is found has a sandbox option that allows users to test the tool before downloading it, and a pedagogy section that explains how it can be used to enhance educational practices and enrich online discussion.

GNotes Team. *GNotes*. n.d. Web. 22 February 2016. <<https://www.gnotes.me/>>. GNotes is a downloadable tool that allows users to take notes and synchronise them between websites and mobile devices. The tool supports texts, images, handwriting, and graffiti. It works with both Android and iOS devices, and is aimed at users who prefer to access and manage their documents and notes across devices, and while in transit.

Google Drive. Google. n.d. Web. 6 May 2016. <<https://drive.google.com>>. Google Drive is a browser-based application for document storage, creation, and sharing. Over thirty file types can be saved, and common file types (documents, presentations, spreadsheets) can be created in the Google Drive environment. In addition to allowing users to develop and save files online, Google Drive eases collaboration, as it enables multiple users to chat, comment, and work on the same document simultaneously. The documents also contain a versioning system for users to review specific changes or revert back to previous versions.

Haystack Group. *nb*. n.d. MIT. Web. 9 May 2016. <<http://nb.mit.edu/>>. nb was initially conceived for use in an educational context. It is a web-based annotation tool and service designed with online discussion in mind. nb can be used to collaboratively write, share, and respond to annotations in PDF files. To date, nb has been used primarily in the Massachusetts Institute of Technology classroom settings.

Horman, Jason, and Michael Butscher. *WikiPad*. Version 2.2.0. SourceForge. Web. 9 May 2016. <<http://wikidpad.sourceforge.net/>>.

WikiPad is an open source stand-alone application for note taking, making to-do lists, and saving contacts. It allows straightforward cross-linking of information. The tool also features auto-completion, outline views, search options, and source code navigation. WikiPad addresses information management through its wide variety of personalizable options. It works well with users who need to quickly link their information as it offers auto-completion options and incremental search.

Hypothes.is Team. *Hypothes.is*. 27 May 2016. Web. 27 May 2016. <<https://hypothes.is/>>.

Hypothes.is is an online tool that enables users to add layers of comments and annotations onto web pages. Annotations can be attached to individual article sentences, entire documents, or developing news blogs. It is a free, open source, and non-profit tool. The tool's user base varies, encompassing students, researchers, and publishers. Hypothes.is can be downloaded as an extension, allowing the activation of all its features, after setting up personal accounts.

Institute for the Future of the Book. *CommentPress*. Version 3.8.9. CommentPress. Web. 26 May 2016. <<http://futureofthebook.org/commentpress/>>.

CommentPress is a WordPress plugin that allows users to comment on paragraphs and sentences. This tool enhances annotations, conversations, and debates. The comments are strategically placed adjacent to the text rather than at the bottom of a page or underneath the text, as the authors of this plugin found that this would provide a better and more efficient experience. CommentPress can be used in various contexts including scholarly, educational, journalistic, creative writing, and recreational book clubs. It aims to target a large online community in order to maximise results.

Levine, David K., Gunnar Teege, and Gerhard Hagerer. *Jarnal*. 13 December 2014. Web. 22 February 2016. <<http://www.dklevine.com/general/software/tc1000/jarnal.htm>>.

Jarnal is a downloadable open source application that supports note taking, sketching, journaling, creating presentations, annotating documents, and collaborating. The documents created in Jarnal are useable in other applications. In order to preserve anonymity, Jarnal-produced documents do not store any author metadata. Jarnal can also be used in schools and educational settings.

Media Kit. *Outline*. 1 May 2015. Gorillized Corporation. Web. 22 February 2016. <<http://outline.ws/>>.

Outline is a tool for Apple computers that has various functions, including note taking, data storage, and editing. Changes in Outline can be saved offline, with several backup and password protection options. With this tool, users can import information from the web and export data into other applications through the Share Extensions feature. Outline is characterised by the hierarchy, flexibility, and linkability of created annotations.

Nardello, Massimo. *MyNotex*. 25 May 2016. Lazarus. Web. 27 May 2016. <<https://sites.google.com/site/mynotex/>>.

MyNotex is a tool for GNU/Linux. It facilitates note taking, document filing, and activity management. Users can group their notes by subject, and save them according to title, date, and tags. MyNotex is a downloadable software that is not cloud based. Notes made in MyNotex can be encrypted and decrypted with the AES algorithm, and filed with GNU Privacy Guard (GPG), if available. With this tool, users can add images to notes and attach files that are then saved in the attachments directory.

NowComment. n.d. Fairness.com LLC. Web. 6 May 2016. <<http://nowcomment.com/>>.

NowComment is a free, fast, feature-rich online tool that allows users to have discussions and collaborate on their work. NowComment allows users to comment, sort, skim, and create documents, which they can share with groups. The commenting and reviewing features support personalised annotation and track changes. NowComment is designed to adapt to multiple

professional settings and usages, including education, business, government, public policy, law, and personal use.

Okular Developers. *Okular*. 16 December 2015. KDE Applications. Web. 22 February 2016. <<https://okular.kde.org/>>.

Okular is a universal document viewer that is compatible with various operating systems including Linux, Windows, and Mac OS X. As a free PDF reader, it allows the extraction of embedded files, text selection, reviewing, and annotation. The created annotations are automatically saved in data folders specific to each user. Annotation of text is carried out by highlighting and annotating content. Graphic document annotation has additional features, such as pop-up notes and stamps.

Open Knowledge Foundation Labs. *TEXTUS*. 22 March 2015. Web. 10 May 2016. <<http://textusproject.org/>>.

TEXTUS is an open source reading environment that aims to encourage and enhance professional, online discussion. TEXTUS is designed for working with text and enabling students to collaborate and share ideas on a user-friendly platform. TEXTUS allows users to cite and annotate documents collaboratively or individually. Recently, TEXTUS has been divided into four related, but unique, components: Textus Formatter, a tool that converts standard text; Textus Viewers, a Javascript text display; Textus Wordpress, a plugin for transform TEXTUS tools into Wordpress format; and Textus API, an API creation platform.

Protonotes. *Protonotes*. n.d. Webanza. Web. 10 May 2016. <<http://www.protonotes.com/>>.

Protonotes is a simple, straightforward collaborative annotation tool for prototype development. Protonotes enables the direct addition of notes onto a prototype for the purpose of collaborative development. It is free to use and simply requires installing a JavaScript library into the desired prototype. When the installation is complete, anyone who visits the prototype may view, add, edit, or delete notes. It is best used for teams working on common projects, for the purpose of sharing their notes and feedbacks.

Pyysalo, Sampo. *Brat Rapid Annotation Tool*. 8 November 2012. Crunchy Frog. Web. 22 February 2016. <<http://brat.nlplab.org/>>.

The Brat Rapid Annotation Tool (Brat) is a web-based platform for text annotation. Brat is designed to create structured annotations instead of freeform notes so that the computer can automatically process and interpret the user-generated commentary. The tool permits users to devise text span annotations, relation annotations, and any number of annotations sharing the same roles, such as defining material. Working within this constrained framework, Brat also allows users to specify the details of an annotation using attributes. Brat is useful for many different tasks, including entity mention detection, event extraction, and dependency syntax.

Schneirov, Zachary. *Notational Velocity*. 31 March 2011. Web. 22 February 2016. <<http://notational.net/>>.

Notational Velocity is an open source application that stores and retrieves notes. It allows users to add, search, and edit content. For the purposes of filtering efficiency, notes are expected to be brief and specific. In addition, when a user enters a note in the Search/Title area, Notational Velocity suggests related notes. This tool was designed with no buttons, which limits it to

keyboard input. In Notational Velocity, data is automatically saved and changes are immediately applied. Documents produced can be synchronised with Dropbox, Simplenote, PlainText, Elements, and iA Writer.

Schoenberg, Lawrence, and Barbara Brizdle Schoenberg. *DM: Tools For Digital Annotation and Linking*. n.d. The Schoenberg Institute for Manuscript Studies. Web. 22 February 2016. <<http://schoenberginstitute.org/dm-tools-for-digital-annotation-and-linking>>.

DM: Tools For Digital Annotation and Linking is a platform that supports the annotation of texts and images, or any fragments of these two media. It includes different tools that make it possible for users to mark manuscripts, print materials, photographs, and other types of documents. DM also allows users to comment on the relationships between various elements and link resources to each other. The data can be exported in an XML or TTL format. DM has been included in many past and ongoing projects, including Parker's Scribes, Pelagios, Dictionary of Old English, Virtual Mappa Project, The Pompeii Quadriporticus Project, La Chronique Anonyme Universelle jusques'à la mort de Charles VII, and Insular and Anglo-Saxon Illuminated Manuscripts.

Selz, Dorian, Felix Hurlimann, Patrice Neff, and Christoph Hauzenberger. *Memonic*. 4 January 2012. Nektoon AG. Web. 22 February 2016. <<http://www.memonic.com/>>.

Memonic is a multi-feature tool that supports capturing, organizing, and sharing of material. This tool is available as a website extension and mobile or desktop application. With Memonic, users can clip web content, save web pages, write notes, organise content, take screenshots of a document, and forward e-mails and attachments to collections. Furthermore, content can be organised in folders by tags or groups, and can be shared via tiny URLs. Memonic users include students, teachers, and programmers.

Shilman, Michael, Zile Wei, and David M. Barger. *Freeform Digital Ink Annotation Recognition*. 11 August 2009. Microsoft Corporation. Web. 22 February 2016. <<https://www.google.com/patents/US7574048>>.

Freeform Digital Ink Annotation Recognition is a computer-implemented system that allows the recognition and anchoring of annotation strokes. Through this process, annotations on digital documents can be archived, shared, searched, and manipulated. Freeform Digital Ink Annotation Recognition is used for grouping and classification, as well as for using linguistic content to correctly recognise annotations.

Simplenote. 29 March 2016. Automatic. Web. 27 May 2016. <<http://simplenote.com/>>.

Simplenote is a free tool available for iOS, Android, Mac, Kindle, and as a web application. It can synchronise notes across devices, organise notes through tags, share lists, post relevant instructions, and back up notes. Users can also search through their notes or revert to previous versions easily.

Sparkle. *Skim*. Sourceforge. January 2016. Web. 22 February 2016. <<http://skim-app.sourceforge.net/>>.

Skim is a tool that reads PDF documents for OS X. It has multiple features, but mainly focuses on note taking. Users can add and edit notes on PDF files, as well as highlight text, snapshot, navigate using a table of contents or thumbnails, view their notes and highlights, preview internal links, export their notes as text, and set passwords. In addition, Skim has accessible tools for

cropping, magnifying, and bookmarking. This tool integrates with third party applications such as BibDesk.

SpecLab. *Prism*. 10 November 2015. Scholars Lab. Web. 10 May 2016.

<http://prism.scholarslab.org>.

Prism is an open access, user-friendly tool for crowdsourcing interpretation. Users can highlight different words or sections of a text according to certain predetermined, bounded categories. By allowing the same section of the text to be matched to different categories, Prism demonstrates the multiplicity of possible interpretations while conducting close reading, rather than having one falsely unified category that leaves out space for uncertainty. When annotations are completed, Prism portrays a pie-chart for every word or section, which displays the percentage of all the categories tagged by different users. It can easily be adapted to the classroom environment and is helpful in collectively analyzing literary texts, especially dynamic material like poems, which may have multilayered meanings.

Sopinspace. *Co-ment*. n.d. Abilian SAS. Web. 10 May 2016. <http://www.co-ment.com/>.

co-ment is a web service for viewing, creating, and interacting with annotations. With co-ment, a user may upload or create texts online, invite designated users to comment on files, and revise drafts. According to its website, co-ment is ‘the reference Web service for submitting texts to comments and annotations.’ Via an API, one can create plugins for multiple content management systems and platforms. Notably, co-ment is open source and web-based. Co-ment can be used in cases of political programs, law making, education, contracts, and legal analysis.

Tegeda, Eddie A. *Digress.it*. n.d. Web. 26 May 2016. <http://digress.it/>.

Digress.it attempts to alter e-reading practices by facilitating vertical, right-side commenting on online documents. By shifting the comment space from the more conventional blog-style to side-by-side text and commentary, Digress.it aims to facilitate greater engagement in online reading environments. In this way, Digress.it strives to emulate the long standing textual practice of marginalia. Digress.it is an open source WordPress plug-in and thus primarily intended for use on WordPress blogs and sites. Of note, Digress.it developed from the Institute for the Future of the Book’s CommentPress project. At the time of writing, the tool is being updated.

University of Hamburg. *CATMA*. Version 4.2.0. Web. 10 May 2016. <http://catma.de>.

CATMA is a web-based text analysis and literary research application that permits scholars to work collaboratively by exchanging analytical results online. The application boasts a number of features: users can apply analytical categories and tags, search the text using Query Builder, set predefined statistical and non-statistical analytical functions, visualise text attributes and findings, and share documents, tagsets, and markup. CATMA consists of three modules: the Tagger for markup and tagging of a text, the Analyzer for queries and a variety of text analysis functions, and the Visualizer to create charts and other visualizations of analysis results. This tool is aimed at users with interest in textual analysis and literary research.

Visconti, Amanda. *Infinite Ulysses*. 22 January 2015. Web. 22 February 2016.

<http://www.infiniteulysses.com>.

With Infinite Ulysses users can highlight and annotate passages from James Joyce’s novel *Ulysses*, read through other users’ annotations, and customise annotation filters. Annotations in

Infinite Ulysses can be tagged with unique terms, which allows their filtering by theme. Users can also favourite annotations, which are then added to lists on their account page. Other actions users can take include moving a bookmark to the last page they read, flagging annotations, and rating annotations.

Weiske, Christian. *Tomboy*. 18 April 2016. The GNOME Project. Web. 27 May 2016. <<https://wiki.gnome.org/Apps/Tomboy>>.

Tomboy is a desktop application for simple note taking. It works for Linux, Unix, Windows, and Mac OSX. Users can highlight text, auto-link web and e-mail addresses, style the notes, and create notes within a document. It also synchronises notes across different computers. Tomboy features inline spell-check and an Undo/Redo option. Users are also able to easily link and organise their notes and ideas, which are also searchable. Tomboy offers editing options and tools, and supports various add-ins.

Windows Journal. n.d. Microsoft. Web. 22 February 2016. <<http://windows.microsoft.com/en-ca/windows7/create-and-personalize-handwritten-notes-using-windows-journal>>.

Windows Journal is a downloadable application where users can create journals and personalise their handwritten notes. Users can create templates, e-mail handwritten notes (using their tablets and pens), and insert text into their journals. It includes pen and highlighting settings that can be managed, as well as the possibility for drawing shapes and lines in notes. Windows Journal suits users who like to take notes using pen and paper but still want to save their data digitally.

WordHoard. 1 March 2011. Northwestern University. Web. 9 May 2016. <<http://wordhoard.northwestern.edu/userman/index.html>>.

WordHoard is a free Java application developed by Northwestern University. It enables tagging and annotations of large texts or transcribed speech. Currently, WordHoard is aimed toward early Greek epics and early modern English plays, but also includes texts by Chaucer and others. With WordHoard users can easily annotate and analyze texts by looking at word frequency, lemmatization, and text comparison, or else by applying custom queries.

Wright, Jacob, and Derek Andriesian. *MyStickies*. n.d. Web. 6 May 2016. <<https://www.mystickies.com/>>.

MyStickies is a tool that allows users to add digital sticky notes on websites and web pages. It provides a robust interface that facilitates the browsing, searching, sorting, and editing of user notes. Users can mark up a page however they would like, and in accordance with their purposes, allowing for an efficient retrieval of the annotations made and notes taken. Described as ‘bookmarks on steroids,’ MyStickies enhances the bookmarking practice of saving the title and URL by allowing users to generate their own commentary on the resource.

Yellow Pen. Marker.to. 9 November 2014. Web. 22 February 2016. <<http://marker.to/>>.

Yellow Pen is a free Google Chrome add-on for web pages. With this tool, users can highlight text and bookmark pages. Marker.to users are able to see their highlighted pages in one place through ‘My Markers’ feature. Marker.to makes it simple for users to share their annotated text with others: each highlighted passage is given a special URL that the user can share via social media or email.

Category II: Annotating Media

The objective of this category is to address a variety of approaches to annotating media, ranging from manual and semi-automated techniques to completely automated practices. The resources consist of open access annotation tools and articles that tackle central issues around present day annotation techniques. Media annotation takes the form of structured or unstructured data, where many controlled ontologies are being expanded or developed in order to accommodate a diverse body of users. There is a strong emphasis on collaborative practices and the ability to disseminate, exchange and reuse annotations across different mediums. In turn, considering collaborative practices raises the question of interoperability. Authors consider compatibility issues by pointing out the limitations of current tools in terms of supporting annotation across different mediums and formats, and offer possible solutions to overcome this problem (Cole, Han 2011). Annotation retrieval is also becoming more challenging, considering the drastically increasing amount of data. Authors propose that shifting toward semantic web practices can help resolve this problem (Nicola et al.; Cole, Han 2011; Rahan, Siddiqi 2011; Walter, Nagypal 2007). Several publications tackle interface design, namely the development of appropriate and up-to-date interfaces and navigation techniques that reflect evolving annotation practices (Bowers et al. 2013). A number of resources also engage with experimentation and implementation of annotations in different types of learning environments, ranging from the classroom to interactive museum annotation systems (Chao et al. 2010; Mu 2010; Stevens, Toro Martell 2003).

Articles

Auer, Eric, Albert Russel, Han Aloetjes, Peter Wittenburg, Oliver Schreer, S. Masnieri, Daniel Schneider, and Sebastian Tschopel. 'ELAN as flexible annotation framework for sound and image processing detectors.' *Proceedings of the Seventh Conference on International Language Resources and Evaluation*, (Paris, 2010), 890–3. Web. 28 May 2016.

Auer, Russel, Aloetjes, Wittenburg, Schreer, Masnieri, Schneider, and Tschopel demonstrate ELAN, a tool for web and video annotation that utilises semi-automated methods in order to handle diverse digital multimedia records in media collections. Its primary aim is to facilitate the practice of manual annotation of digital records traditionally carried out in the humanities. ELAN functions through pattern recognition solutions. Auer et al. observe that annotation speed increases when annotators work in an environment with a simple interface and familiar tool (RE1) framework. According to the authors, the developers are determining what types of detectors still need to be added, and what options need to be modified in order to make the tool useful to a wider array of researchers. The creation of the tool was inspired by the lack of appropriate technology that could accurately annotate the diverse records stored in the archives of the Max Planck Institutes, and from a desire to make this technology openly available to humanities researchers facing a similar problem.

Bernava, Carlo, Giacorno Fiumara, Dario Maggiorini, Alessandro Proveti, and Laura Ripamonti. 'RDF annotation of second life objects: knowledge representation meets social virtual reality.' *Computational and Mathematical Organization Theory*, 20.1 (2014), 20–35. Web. 28 May 2016.

Bernava, Fiumara, Maggiorini, Proveti, and Ripamonti present an application for the annotation of graphical objects in the web-based game environment Second Life (SL). This is done by implementing Primitives (Prisms)—the building blocks of the virtual environment—that use

folksonomy tagging in the form of semantic social tags generated by the Resource Description Framework (RDF). It also allows users to contribute to the folksonomy by providing annotations. This project aims to create a knowledgebase that would be accessible and readable by both users and applications in SL. SL is a fruitful environment to conduct folksonomy tagging because it has a large community that fosters the development of social tags and builds the meaning of an object over time.

Bertini, Marco, Alberto Del Bimbo, Carlo Torniai, Costantino Grana, and Rita Cucchiara.

‘Dynamic pictorial ontologies for video digital libraries annotation.’ *Proceedings of the Workshop on Multimedia Information Retrieval on the Many Faces of Multimedia Semantics*, (New York, 2007), 47–56. Web. 28 May 2016.

Bertini, Del Bimbo, Torniai, Grana, and Cucchiara propose a dynamic pictorial ontology model for video annotation. The model aims to remediate the limitations that are often encountered in producing and retrieving annotations for video documents. These limitations are often a result of ontologies that are expressed in linguistic terms—a format that is ineffective when it comes to describing different types of media. This model is directed toward two levels of perceptual features: low-level perceptual features, which are basic descriptors used for things such as color histograms, indoor or outdoor scene settings; and high-level semantic features, which are the more complex features used for things like face detection and recognition. This model attempts to push the dynamic pictorial ontology framework forward by allowing it to work with annotations of different complexities.

Boujut, Jean-Francois. ‘User-defined annotations: artefacts for coordination and shared understanding in design teams.’ *Journal of Engineering Design*, 14.4 (2003), 409–19. Web. 6 May 2016.

Boujut addresses the role of annotation in collaborative design and product representation. According to the authors, existing computer-aided design (CAD) systems are poorly equipped for representing technical information about artefacts (including design, procedures, requirement lists) and for facilitating collaborative design work, which are often the two central components of cooperative work environments. The authors demonstrate how the creation of specific symbols that are associated with unique product information can be implemented into the CAD model as the basis of proposing certain modifications. The symbolic annotations are assigned meaning and become a tool for knowledge creation and mobilization, as well as the platform for cooperation that has a tangible effect on the manufacturing process. The process described in this article facilitates the collaborative aspect of design work by redirecting it to tools that foster knowledge creation.

Bowers, Chris, Chris Creed, Benjamin R. Cowan, and Russell Beale. ‘Touching annotations: a visual metaphor for navigation of annotation in digital documents.’ *International Journal of Human-Computer Studies*, 71.12 (2013), 1103–11. Web. 28 May 2016.

Bowers, Creed, Cowan, and Beale explore optimal approaches to navigating annotations in a touch display interface designed for interacting with cultural materials. Two navigation approaches are compared: the scrollbar condition, which is the traditional navigation interface approach, and the tab condition, which exemplifies the use of real-world metaphors. The two main hypotheses set out for this study are that the interaction effect between annotation navigation and task type will affect efficiency (such as in tasks that are dependent on locating

annotations in relation to each other and to the document), and that the participants in each of these conditions will rate them significantly different from each other. After conducting a control study, the results demonstrate that the task type itself is crucial in determining which type of navigation is more efficient. The real world tab navigation condition did not show improved task efficiency, and in the case of content-based tasks on touchables, the scrollbar condition proved to be advantageous in task completion.

Chakravarthy, Ajay, Fabio Cirravegna, and Vitaveska Lanfranchi. 'Cross-media document annotation and enrichment.' *CEUR Workshop Proceedings*, 209 (2006), n.p.

Chakravarthy, Cirravegna, and Lanfranchi argue that keyword matching based systems are no longer adequate for information retrieval since they are unable to appropriately situate the context due to the radically increasing amount of data. Using metadata to enrich these documents allows placing them in the right content and context, therefore resulting in an optimal solution for data retrieval and management. Chakravarthy, Cirravegna, and Lanfranchi identify the main requirements for cross-media annotation: annotation types and levels, annotation as community activity, annotation and document lifecycle, annotation complexity, ontology complexity, and knowledge reuse. The authors introduce AKTiveMedia, a tool that supports annotation across different types of media, including texts and images, and also supports different formats of annotation, varying from free-range comments to controlled ontology-based annotations. They demonstrate how AktiveMedia supports different annotation formats and plan to explore three main directions in the future, including community annotations in terms of privacy and ownership; folksonomy tagging in industrial environments; and the annotation of 3D images.

Chao, Po-Yao, Gwo-Dong Chen, and Chih-Wei Chang. 'Developing a cross-media system to facilitate question-driven annotations on paper textbooks.' *Educational Technology & Society*, 13.4 (2010), 38–49. Web. 28 May 2016.

Chao, Chen, and Chang present a model for a cross-media annotation system. The pedagogical aim of the project consists of combining physical and digital mediums to support question-driven creation and management of annotations. Although annotation in pedagogical settings has been extensively researched, the authors point to an incongruity in integrating paper annotations into digital media formats. They introduce a digital pen that selects printed text and organises it according to controlling questions, and that also links print and digital resources. They conduct a small study to reveal the effects this has on note taking for students, and demonstrate that it enhances retention of key concepts and improves performance, measured according to the explicit learning goals set out at the beginning of the study. However, the authors argue that a larger case study ought to be conducted before these results can be generalised outside of the controlled case study presented in this article.

Cole, Timothy W., and Myung-Ja Han. 'The Open Annotations Collaboration phase i: towards a shared, interoperable data model for scholarly annotation.' *Journal of the Chicago Colloquium on Digital Humanities and Computer Science*, 1.3 (2011), n.p. Web. 8 May 2017.

Cole and Han explore the outcomes of Phase I of the Open Annotation Collaboration (OAC) that is primarily aimed at developing a standard for creating, managing and disseminating annotations of web resources through a model that imitates Linked Data and Semantic Web fundamentals. The key issue associated with annotating media is that present technology is

unable to support the interoperability of the large variety of formats available, making it counterproductive for scholarly work. This article demonstrates a prototype model that employs use cases primarily based on Renaissance emblem studies. The authors argue that this model has the potential to facilitate annotation across different environments, while leaving room for the customization of certain features for more specific communities without reducing interoperability. Cole and Han believe that Phase II of the project would address the remaining issues, and the authors aim to eventually disseminate these standards to scholarly environments in the form of a finalised version of the application.

*Dingli, Alexiei. ‘Annotating different media.’ *Knowledge Annotation: Making Implicit Knowledge Explicit*, (Berlin, 2011). Web. 6 May 2016.

Dingli captures and engages deeply with a wide spectrum of annotation theory, practices, and aspects. He asserts the benefit of shared human computation in tackling large projects by pointing to a number of successful collaborative practices, and demonstrates that even manual annotations are enhanced by Web 2.0 technologies. In fact, one chapter is dedicated to manual annotation, where Dingli discusses various related issues, including creator subjectivity and privacy policies. He argues that in order to support the web of the future, there needs to be a shift towards the semantic web, which can offer solutions for the retrieval and use of information. Dingli asserts that many of concepts and the technologies to actualise the semantic web are in place, such as the XML standards, the Resource Description Framework (RDF) and the Web Ontology Language (OWL). Dingli also discusses semi-automated and automated annotations, where he analyzes various tools, systems, and algorithms to showcase the possibilities that arise from these practices and to point to their limitations. Dingli argues that the redundancy of information on the web, when approached appropriately, can in fact work for the purposes of quality control since the data is gathered from a rich source of varied users with a diverse skillset, and that exploiting the redundancy of web information can result in interesting outcomes.

Ellis, Sean, and Dennis Groth. ‘A collaborative annotation system for data visualization.’ *Proceedings of the Working Conference on Advanced Visual Interfaces*. (New York, 2004), 411–14. Web. 30 May 2016.

Ellis and Groth demonstrate Collaborative Annotations on Visualizations (CAV), a system designed to facilitate the creation and collection of annotations for visual data in a tablet medium. Previously, collaborative work on dynamic visual data has been carried out by working in a static non-digital medium, such as with paper print-outs, or by gathering around one electronic device, and has therefore been inefficient in supporting productive collaboration. CAV remedies the limitations of previous practices by providing a framework that supports working with electronic visualizations from remote workspaces, and annotating visual data with the use of digital ink. It also supports textual and audio annotations. These annotations are anchored to the frames they describe, and can be browsed in context or separately.

*Ferro, Nicola, Gary Munnelly, Cormac Hampson, and Owen Conlan. ‘Fostering interaction with cultural heritage material via annotations: the FAST-CAT way.’ *Bridging Between Cultural Heritage Institutions*. (Berlin, 2014). Web. 27 May 2016.

The Flexible Annotation Semantic Tool - Content Annotation Tool (FAST-CAT) is a system for annotating digital content, where FAST refers to the backend that provides annotation

functionalities and the CAT is the front end Web annotation tool. Ferro, Hampson, and Conlan argue that most tools are designed to work within a single format and those that go beyond often have limited features. The model proposed in this article treats an annotation as a multimedia object that can materialise in the form of different signs—such as text or image—and these signs can carry various semantic meanings and formats. It supports a search mode that is optimal for both structured and unstructured content, and the annotations can be public, private, or shared. FAST-CAT is part of the CULTURA project, which develops personalised access and data presentation and retrieval in two historical collections in a digital humanities context. The future aim of the project is to expand from text and image annotation to other multimedia types in order to expand the scope of its use.

Geurts, Joost, Jacco van Ossenbruggen, and Lynda Hardman. ‘Requirements for practical multimedia annotation.’ *Proceedings Workshop on Multimedia and the Semantic Web*, (Berlin, 2005). Web. 28 May 2016.

Geurts, van Ossenbruggen, and Hardman discuss media vocabularies for multimedia annotation applications. They address technical descriptions as well as content-level descriptions, claiming that there needs to be a lightweight, multimedia ontology for such systems. The authors claim that there is a complex relationship between the concept and its annotations, and the digital media item and its annotations. They discuss issues with problematic content description, such as granularity, complexity, and size of annotations, suggesting methods and solutions for dealing with such issues. The authors continue to address the problem of structure of annotation and annotation schemes for content-level metadata, explaining the advantages of schema including validation, template structures, enforcing syntactic relations between properties, and enforcing semantic constraints. Geurts, van Ossenbruggen, and Hardman provide a list of requirements for multimedia annotation, and conclude that incorporating these requirements necessitates the contribution of various communities like Semantic Web and multimedia and digital library communities.

Hodecker, Kara, and Naomi Pilosof. ‘Evernote case study: designing first impressions that last.’ Presentation at App Developers Conference, 2013. Web. 27 May 2016.

Hoedecker and Pilosof give a talk on five lessons the Evernote team has learned on its journey through developing a software platform. The first lesson is to share the value of Evernote with users, as well as the how-to on features and functionality. They explain that getting feedback from users and sharing it with others is one way to show value, and can be easily facilitated by a task checklist. Lesson 2 is the importance of user feedback for developing a product that serves user needs. Evernote uses tools like proto.io and invision to receive user feedback. Hoedecker and Pilosof also cite beta user-group feedback and the option of support tickets. The third lesson they discuss is supporting users when they need it, such as providing tips on how to effectively use a specific feature. The fourth point is the simplicity of the message, which they describe through the example of their website. The last issue, lesson 5, that Hoedecker and Pilosof address is how to extend one’s brand and implement strategies through marketing products. They conclude by acknowledging Evernote as a work-in-progress that is undergoing constant refining.

Hunter, Jane, Tim Cole, Robert Sanderson, and Herbert Van de Sompel. ‘The Open Annotation Collaboration: a data model to support sharing and interoperability of scholarly annotations.’ *Digital Humanities*, (2010), 175–8. Web. 28 May 2016.

Hunter, Cole, Sanderson, and Van de Sompel discuss the Open Annotation Collaboration project (OAC). In particular, the authors consider the question of interoperability in the scholarly annotations model. This model operates on multiple levels and across various media types, collections, applications and clients; the only common denominator necessary for OAC to function is that both the material and the annotations should be web accessible. The authors highlight various OAC features with the implemented model, which include cross-environment annotations, advanced annotation for humanities scholars across various collections, customization of annotations without decreased interoperability, and automated machine analysis. The authors argue that this web-centric model enhances existing environments and takes advantage of the possibilities that the web environment has to offer.

Mu, Xiangming. 'Towards effective video annotation: an approach to automatically link notes with video content.' *Computers and Education*, 55.4 (2010), 1752–63. Web. 28 May 2016.

Xiangming describes a video annotation tool called Interactive Shared Education Environment (ISEE) that fosters distant collaborative learning environments. The tool is aimed at providing optimal approaches to video annotation by introducing a video based learning system. The author describes two case studies: a comparison study between the performance of individuals who are using the Smartlink function and those who are not, and a follow-up eye-tracking study. The Smartlink function synchronises video annotations with video progression. The results demonstrate that Smartlinks enhance learning activities since they allow users to write improved video annotations by providing appropriate context. This leaves them more time to focus on critical activities rather than video control. The eye-tracking study also shows that Smartlink ISEE improves the effectiveness of learning by leaving more space to focus on content-based activities.

Rahman, Fazilatur, and Jawed Siddiqi. 'Semantic annotation of digital music.' *Journal of Computer Science and System Sciences*, 78.4 (2011), 1218–31. Web. 28 May 2016.

Rahman and Siddiqi present mpeg-7music, an ontology for annotating music files with semantic metadata. The issues associated with retrieving digital music in search engines through traditional means (such as keyword search or search by title and song name) are increasing with the growing amount of music published on the web. Most semantic ontology systems that support tagging have been operating with a lack of a standardised vocabulary and have been inefficient in information retrieval. The proposed ontology builds on the MPEG-7 audio ontology and extends it to include the annotation of music resources by adding a semantic web ontology standard (OWL 1.0). A novel feature of mpeg-7music is that it allows the music producers to tag the file according to its semantic properties.

Ruotsalo, Tuukka, Lora Aroyo, and Guus Schreiber. 'Knowledge-based linguistic annotation of digital cultural heritage collections.' *IEEE Intelligent Systems*, 24.30 (2009), 64-75. Web. 28 May 2016.

Ruotsalo, Aroyo, and Shrieber propose a model that automatically annotates cultural heritage collections with the use of structured vocabulary and role identification techniques. The authors state that existing methods tend to adhere to manual annotation, which is a tedious process that often results in numerous errors. They propose a linguistic annotation method that focuses on role identification through a number of processes, including natural language processing and

background knowledge about the object through structured vocabularies. In order to test the accuracy of this method, the authors conduct a case study with two goals in mind: measuring the accuracy of the role identification model in comparison to human annotators, and testing whether background knowledge through structured vocabulary improves the overall performance. The results show that there is little difference between the role identification model and human annotators, and that background knowledge improves results. However, the study does not take into account the bias factor that may have been involved in concept identification, nor did it focus on dynamic context—both of which are proposed areas of future research.

Russel, Bryan C., Antonio Torralba, Kevin P. Murphy, and William T. Freeman. ‘LabelMe: a database and web-based tool for image annotation.’ *International Journal of Computer Vision*, 77.1 (2008), 157–73. Web. 28 May 2016.

Russel, Torralba, Murphy, and Freeman strive to build a large collection of images with ground truth labels – labels that provide information about the object’s identity, location, shape, pose, and other attributes – that may be used for object detection and recognition. According to the authors, existing datasets limit object detection and recognition due to the size or quality of their content. They argue that the field would benefit from large collections of images and videos. In order to facilitate this, they present LabelMe – a user-friendly image annotation tool that supports the sharing of annotations and functions on a number of platforms. The tool collects large datasets that are used for label training. By December 2006, LabelMe consisted of 111490 polygons and was distinct from other datasets through a number of additional features, such as providing object class recognition, supporting patch-based object detector training, containing a diversity of object classes and images, and containing a large amount of non-copyrighted images. For the disambiguation between the descriptions, the tool incorporates WordNet – an electronic dictionary that organises information in the form of a tree with branches that represent various nodes. These nodes have been proven to generally increase the number of retrieved labels. In the final section of the article, the authors compare the contents of LabelMe to other similar existing datasets and statistically demonstrate its lead in the number of categories, images and annotations it contains.

Saklofske, Jon, and Jake Bruce, with the INKE Research Group. ‘Beyond browsing and reading: the open work of digital scholarly editions.’ *Scholarly and Research Communication*, 4.3 (2013), n.p. Web.28 May 2016.

Saklofske and Bruce ask: ‘How can digital scholarly editions take full advantage of environmentally-generated opportunities to focus on process, collaboration, and distributed control without losing the traditional affordances that make an edition “scholarly?”’ This question is explored through a case study of the Implementing New Knowledge Environments (INKE) NewRadial prototype. As a virtual environment, this prototype reimagines the scholarly edition as a workspace rather than a stagnant object. The authors eschew the isolated print-based technology that leaves readers stranded in favor of adopting a model that facilitates scholarly debate and exchange. NewRadial displays three main types of objects: nodes, edges, and groups. The nodes are image icons that can be sorted into user-generated groups or radials. Individual documents or groups can be connected to other documents or groups by an edge in order to indicate a significant relationship. Saklofske and Bruce argue that NewRadial takes advantage of web-based affordances by allowing users to comment on their collections.

Stevens, Reed, and Sandra Toro Martell. 'Leaving a trace: supporting MuseumVisitor interaction and interpretation with digital media annotation systems.' *The Journal of Museum Education*, 28.2 (2003), 25–31. Web. 28 May 2016.

Stevens and Martell present VideoTraces and ArtTraces, two digital annotation systems built into the museum environment that records visitor reflections on authentic artifacts through 'traces.' The two main purposes of this system are to create a positive learning environment of constructive experience, and to serve as material for the museum to learn about the reactions of visitors to the different artifacts, in order to inspire discourse. VideoTraces records interaction of users with an exhibit, subsequently allowing for audio annotations and gestural moving. ArtTraces allows the user to narrate and gesture over paintings found at a museum. The authors describe two case studies, one conducted at the Pacific Science Center, and the other in the Seattle Art Museum. Through different types of interactions with visitors, the results demonstrate that these systems were found to be a comfortable and flexible platform for people to present their ideas. Stevens and Martell suggest a number of useful applications for these systems, such as using them for pedagogical exercises for students visiting the museum or for research that investigates response to museum objects.

Walter, Andreas, and Gabor Nagypal. 'Imagenotion – collaborative semantic annotation of images and image parts and work integrated creation of ontologies.' *Proceedings of the 1st Conference on Social Semantic Web*, (2007), n.p. Web. 30 May 2016.

Walter and Nagypal demonstrate a tool for semantic annotation of images and image parts, and introduce a methodology for developing ontologies in a work-integrated environment. The authors argue that many existing models for image tagging use unstructured and non-semantic tagging, while those that have an integrated ontology system are often either too complicated or time consuming. They identify three main directions that may improve image tagging: simplifying the ontology development process for users, combining the development of the ontology with semantic annotation, and having a collaborative ontology development process. They propose an ontology that uses imagenotions, which are graphic representations of an image-based semantic notion. Imagenotions support textual description in a number of languages and are connected to web links that provide background information, making it easier to understand and expand upon. This methodology demonstrates the visual process behind an ontology, along with the relations among the imagenotions within it.

Wang, James, Kurt Grieb, Ya Zhang, Ching-chih Chen, Yixin Chen, and Jia Li. 'Machine annotation and retrieval for digital imagery of historical materials.' *International Journal on Digital Libraries*, 6.1 (2006), 18–29. Web. 30 May 2016.

Wang, Grieb, Zhang, Chen, and Li discuss the Automatic Linguistic Indexing of Pictures (ALIP) system that uses machine-learning techniques for the automatic annotation and retrieval of digital imagery information corresponding to historical materials. This method aims to eventually replace manual annotation of images according to keywords and linguistic description. The authors argue that although manual annotation has a high level of accuracy, it is tedious and time-consuming. The authors train and test ALIP on the Emperor image collections taken from the Chinese Memory Net project that was chosen for the high quality of images and accurate image metadata. The authors carry out two major tests to identify the accuracy of ALIP: testing the five concepts of images from the collection and testing ALIP in more complex circumstances involving additional variables. Although the accuracy for the first experiment is higher, the

results show that more training can enhance results in the second test. The results also show that the identification accuracy increases with a larger set of training images.

Waters, James, and Robert Allen. 'Music metadata in a new key: metadata and annotation for music in a digital world.' *Journal of Library Metadata*, 10.4 (2010), 238–56. Web. 30 May 2016.

Waters and Allen present a survey of the current state of music annotation and metadata systems. They argue that although there has been a strong shift toward metadata and annotation standardization for interoperability and retrieval, a singular method is unlikely due to the wide variety of user needs and complexity involved in annotating and tagging music. This article surveys different types of metadata frameworks, data models, and encoding systems that accommodate these users. Finally, it addresses the issue of the semantic gap between user experience and existing standardised categorizations of music on multiple levels.

Yang, Stephen J.H., Jia Zhang, Addison Y.S. Su, and Jeffery J.P. Tsai. 'A collaborative multimedia annotation tool for enhancing knowledge sharing in CSCL.' *Interactive Learning Environments*, 19.1 (2011), 45–62. Web. 30 May 2016.

Yang, Zhang, Su, and Tsai focus on computer based collaboration techniques that allow individuals to work together without physically being in the same place. The authors argue that computer technologies enhance interactions, communications, coordination, and knowledge sharing. Annotation is a key part of knowledge sharing because it enables participants to explore and exploit valuable ideas. The authors discuss the application of web technologies in building social software that facilitates knowledge sharing. Yang et al. assert that effective web-based annotation tools should be able to facilitate online discussions between multiple users. The authors conduct a case study on the annotation platform PAMS 2.0 and set specific learning outcomes, which indicated that learning is enhanced through personal annotations.

Tools

**AnnotateIt/Annotator*. 7 November 2015. Open Knowledge Foundation. Web. 22 February 2016. <<http://annotateit.org>>.

AnnotateIt is a user-friendly web annotator system that comprises the JavaScript tool Annotator, and a bookmarklet that supports the annotation of any website. It facilitates social knowledge creation through continuous collaborative annotation. The user can tag annotations, markdown content, and personalise access permission. The Open Knowledge Foundation designed Annotator to be easily extendable in order to potentially include more features. Of note, the Open Knowledge Foundation has developed many social knowledge creation tools, including: BibServer (<http://bibserver.org>), CKAN (<http://ckan.org/>), and TEXTUS (<http://textusproject.org/>).

*Annotation Studio Team. *Annotation Studio*. Version 2.1.0. MIT Hyperstudio. Web. 25 May 2016. <<http://www.annotationstudio.org/>>.

Annotation Studio is a set of web-based collaborative annotation tools. With Annotation Studio, users can read, annotate, and share documents. It allows users to organise annotated documents, making document collections easy to search. Users can also compose their own documents and refer to Annotation Studio to brainstorm, write, and review. As evinced by its straightforward design, this suite of tools is well suited for pedagogical purposes, but can also be used outside of

the classroom. For example, this tool has been used for close reading, public digital humanities, creative writing.

*Annotea Team. *Annotea*. 31 October 2005. W3C. Web. 25 May 2016.

<<https://www.w3.org/2001/Annotea/>>.

Annotea is a web-based project that enhances collaboration by allowing users to share metadata, annotations, and bookmarks. Annotations associated with a given document can be downloaded off of various servers, giving individuals access to other users' annotations as well as their own. With Annotea, users can use bookmarks to organise the documents according to topics. This tool is open access and contributes to the semantic web through the Resource Description Framework (RDF) annotation schema for describing annotation metadata.

Auber, Oliver, Pierre-Antoine Champin, and Yannik Prie. *Advene*. 5 June 2012. LIRIS. Web. 22 February 2016. <<http://www.advene.org/>>.

Advene is a digital project that provides visualization and editing tools for audiovisual documents and their hypervideos, which are the hyperlinked and clickable anchors attached to these documents. A platform for users to comment on and analyze different videos, Advene also facilitates the sharing and exchange of generated information. The project keeps track of how different communities distribute and circulate their information in order to utilise this data in creating new user-friendly interfaces that respond to evolving social knowledge creation practices, specifically the dissemination of user responses to video content.

Austrian Institute of Technology. *Annotorious*. Version 0.6.4. MIT. Web. 25 May 2016.

<<http://annotorious.github.io/index.html>>.

With Annotorious, users can annotate and comment on images, build annotation mashups with the corresponding JavaScript API, and customise their work due to its flexible design. Annotorious supports various annotating options through the insertion of code lines that activate specific options. The tool is open source, and can be implemented into web pages by adding a certain code line for activation.

**Axiom*. n.d. Axiom Networks Inc. Web. 22 February 2016. <<https://www.axiomnetworks.ca>>.

Axiom serves many purposes, such as annotating different types of documents, collaborating on projects, capturing web pages, and labeling annotations. Axiom helps users to organise documents simply by dragging and dropping them into the interface, and supports different formats, including PDF and Microsoft Word documents. It also allows users to import documents from Google Drive and Dropbox. Options include highlighters, pens, and sticky notes. Furthermore, Axiom comes in the form of a Google Chrome plug-in that functions on most computer systems.

Bruce, Jake, Jon Saklofske, and Rick Giles. *New Radial*. 24 September 2013. INKE Group. Web. 22 February 2016. <<http://inke.acadiau.ca/newradial/>>.

NewRadial is a web-based environment designed to facilitate humanities research and collaboration. The tool allows users to organise, gather, search, and annotate digital content in a visual manner by creating circular networks. NewRadial functions as a dynamic workspace by allowing users to manipulate their data on screen and create radials, or groupings, of objects based on their research interest. NewRadial is designed to be a space where scholars can

exchange knowledge and debate concepts through centralised and mapped annotation of collections.

Evernote. n.d. Evernote Corporation. Web. <<http://evernote.com/>>.

Evernote is a platform for capturing and archiving digital content. Applicable content includes formatted text, web pages, images, audio, and handwritten text. Once added to the tool, every individual file or document becomes a note, and these notes can be easily shared, organised, and archived. Evernote facilitates individual research and project management, as well as collaborative work through sharing practices and an embedded chat-like functionality that supports real time communication. The tool allows users to sync their activity across different mobile and computer devices.

*Glass, Geof. *Marginalia*. 7 October 2015. Web. 27 May 2015. <<http://webmarginalia.net/>>.

Marginalia is an open source Javascript web annotation system that allows users to highlight text and write notes. It is primarily designed with education, collaboration, and online discussion in mind, but could be easily adapted for individual annotation practices. As a web annotation system, Marginalia integrates with learning management systems like Moodle. The website on which the tool is found has a sandbox option that allows users to test the tool before downloading it, and a pedagogy section that explains how it can be used to enhance educational practices and enrich online discussion.

Krom, Robin. *Greenshot*. SourceForge. 24 May 2016. Web. 27 May 2016. <<http://getgreenshot.org/>>.

Greenshot is an open source Windows software tool that supports the creation and annotation of screenshots. The tool captures both images and entire web pages through a scroll down function. Users can highlight or edit the content, as well as export the screenshot in a variety of different formats. It is an optimal solution for users from different fields for creating, managing, and exporting screenshots. The website on which the tool is found also contains a blog that is updated occasionally with helpful tips, new releases, and advice on how to improve the general user experience.

Net 7. *Pundit*. 29 October 2015. Pundit LAB. Web. 22 February 2016. <<http://thepund.it/>>.

Pundit is an open source annotation tool that allows users to comment, bookmark, highlight, or tag web pages. One of its distinctive features is the option to create semantically structured data in the form of annotations that can be reused, therefore fostering collaborative and social creation and dissemination of knowledge. This functionality is carried out by adopting linked data standards that allows users to connect various sections of a text with each other, and encourages more effective web navigation. User work can be accessed through a central, searchable dashboard. This tool is primarily designed for enhancing research, work, and study practices.

Open-Sankoré. n.d. Sankore. Web. 22 February 2016. <<http://open-sankore.org/>>.

Open-Sankoré is an open-source pedagogical program that supports annotating, highlighting, and drawing on various content, including text, images, flash images and videos. The user can access the web directly from within the app and start working with the content directly. Open-Sankoré aims to enrich digital pedagogical experiences and serves as a multi-platform that supports various languages. It provides users with access to a wide array of digital teaching

resources and supports the importation of multimedia files onto the course content. The tool functions on most hardware, and allows sharing and exchanging documents in a web environment.

President and Fellows of Harvard College. *Highbrow*. 14 November 2011. Harvard Library Lab. Web. 30 May 2016. <<https://osc.hul.harvard.edu/liblab/projects/highbrow-textual-annotation-browser>>.

Highbrow is a textual annotation browser and visualization tool. It visualises the density of scholarly annotations and references in individual texts, and can compare multiple texts to indicate patterns or highlight areas of interest for scholars. Users can view the visualizations at a higher level of quality that indicates density, or else zoom in for more detailed information. Highbrow functions for textual annotations as well as video and audio annotations.

Romano, Tom. *Madcow*. 11 October 2013. 4impact. Web. 22 February 2016. <<http://www.web-annotations.com/ipages/>>.

Madcow is a visual interface for annotating web pages. It is a multimedia annotation system that plugs into a standard web-browser. Madcow has a sophisticated annotation function that allows users to annotate multiple objects in different formats and to display the annotations in a customizable way (insertions, comments, questions, integrations, and announcements). Madcow also allows users to upload and save multimedia files within the annotation itself. The tool is designed for collaborative practices and supports annotation distribution and circulation in a web environment. Further, the annotations themselves can be turned into discussion threads, thereby promoting online discussion and collaboration. Users can create private groups or allow the tool access to their information in order to perform candidate matching with users that share similar interests.

*Schoenberg, Lawrence, and Barbara Brizdle Schoenberg. *DM: Tools For Digital Annotation and Linking*. n.d. The Schoenberg Institute for Manuscript Studies. Web. 22 February 2016. <<http://schoenberginstitute.org/dm-tools-for-digital-annotation-and-linking>>.

DM: Tools For Digital Annotation and Linking is a platform that supports the annotation of texts and images, or any fragments of these two media. It includes different tools that make it possible for users to mark manuscripts, print material, photographs, and other types of documents. DM also allows users to comment on the relationships between various elements and link resources to each other. The data can be exported in an XML or TTL format. DM has been included in many past and ongoing projects, including Parker's Scribes, Pelagios, Dictionary of Old English, Virtual Mappa Project, The Pompeii Quadriporticus Project, La Chronique Anonyme Universelle jusques'à la mort de Charles VII, and Insular and Anglo-Saxon Illuminated Manuscripts.

Category III: Annotation Theory and Practice

This category speculates about how annotation practices can be improved to ensure they facilitate evolving user needs. Many resources focus on the practical implementation of these ideas into models and functioning tools through prototyping. As an area of critical inquiry, annotation requires definition and categorization (MacMullen 2006). A number of publications adopt a survey format that scans annotation models and tools, as well as relevant, critical research in the field (Marshall 2000; Wolfe 2002). This category also includes articles that address various types of collaborative annotation and folksonomy tagging approaches, including

collaborative digital scholarly editing (Siemens et al. 2012; Smith 2004). The publications in this category are concerned with issues of annotation organization, management, and retrieval; a number of authors are immersed in discussions about creating optimal knowledge management support systems, as well as shifting to the semantic web as a space for creating, organizing, and retrieving annotations (Ginsburg and Kambil 1999; Kaplan et al. 2011; Dingli 2011). Finally, the recurring themes of data interoperability and data appropriation, as well as the creation and maintenance of flexible annotation systems that support a variety of formats, are addressed.

Articles

Adriano, Christian Medeiros, and Ivan Luiz Marques Ricarte. 'Essential requirements for digital annotation systems.' *Revista de Sistemas de Informacao da FSMA*, 9 (2012), 24–44.

Web. 30 May 2016.

Adriano and Ricarte present the essential requirements for digital annotations systems. They define annotations and documents as independent artifacts and claim that the implementation of such a requirement will result in more robust digital annotation systems. Adriano and Ricarte start by addressing basic concepts of annotation, explaining that annotations should be autonomous from their corresponding documents, yet interdependent. They then approach annotation as a result of reading, as note taking, as a tool for discussion, as means for recollection, and as a review. The authors then list their essential requirements, referring to suggested fundamentals for software engineering. After discussing the fundamentals, Adriana and Ricarte present their implemented prototype through a number of phases. The authors conclude that their analysis of different systems and their description of use scenarios led to the creation of a classification of annotation systems, highlighting that their conceptual metaphors can be applied to other collaborative scenarios.

Agosti, Maristella, and Nicola Ferro. 'A formal model of annotation of digital content.' *ACM Transactions on Information Systems (TOIS)*, 26.1 (2007), n.p. Web. 30 May 2016.

Agosti and Ferro propose a formal model for tackling the syntactic and semantic aspects of annotations, and defining relationships between annotations and annotated information resources. They present features and uses of annotations relevant to their model, which are annotations as metadata and annotations as content. Agosti and Ferro discuss modeling annotations, which they base on two dimensions: structure of the content and structure of the annotation. This model points to the need for various levels of access to annotations, including private, shared, or public. The authors explain how the formal model targets relationships among concepts of annotation areas, delimiting the boundaries of each area. The areas covered by the model are identification, cooperation, linking, semantics, and materialization. Agosti and Ferro claim that the suggested model formalises the time dimension of annotations by introducing the notion of document-annotation hypertext.

*Bauer, Matthias, and Angela Zirker. 'Whipping boys explained: literary annotation and digital humanities.' *Literary Studies in the Digital Age: An Evolving Anthology*. Raymond G. Siemens, Ken Price, Dene Grigar, and Elizabeth Lorang, eds. (New York, 2016), n.p. Web. 8 May 2017.

Bauer and Zirker discuss the propose of annotation, evaluate the effectiveness of current annotation methods, and provide a list of best practices for moving forward. They argue that commentary has almost always been a part of reading, but the problems of annotation are rarely

addressed or theorized. They argue that annotation is intimately tied to medium and cognition, and that our annotation system should be revised reflect the individual needs of a reader. Further to this, the authors share a project started in 2011 at the University of Tübingen that focuses on audience and annotation by creating a commentary schema that presents relevant information to the reader in the form linguistic, formal, intratextual, intertextual, contextual, or interpretive annotation.

Berland, Robyn O. 'A.nnotate & Pliny: learning, study & research tools for the digital age.' *Connect: Information Technology*, (2009), n.p. Web. 30 May 2016.

Berland discusses the management of information and the positive effects of using digital tools in contemporary work environment, such as reducing print. He addresses the issues of collaborative annotation and digital annotation as a file in the process of development, and presents freely available and downloadable tools. He discusses A.nnotate, specifically the dashboard, the document management system, annotation tools, and notes management. As for Pliny, the list of features is longer and includes note taking with web-based materials, the web browser and reference area, the process of creating and managing notes, the resource explorer, annotating PDF files, importing PDFs, the PDF viewer, annotating images, and managing images.

Bradley, John, and Paul Vetch. 'Supporting annotation as a scholarly tool – experience from the Online Chopin Variorum Edition.' *Digital Scholarship in the Humanities* formerly *Literary and Linguistic Computing*, 22.2 (2007), 225–41. Web. 30 May 2016.

Bradley and Vetch define annotation as the process of writing in the margins. They note the important qualities of annotations that distinguish casual marking (semi-automatic) from cognitive note taking. They use Online Chopin Variorum Project (OCVE) as an example of separating annotations from their source document, claiming that the separate ownership aspect of annotations challenges humanities computing methods. The authors suggest that OCVE provides end users with the tools necessary to allow them to develop their own models corresponding to the resource at hand. Bradley and Vetch continue to discuss different annotation activities and models: digital ink annotation, superimposition, juxtaposition, and combination/interpolation. The authors also explain the technical requirements of the annotation tool within OCVE, getting at successes and failures of the platform. They conclude with a glimpse into future work on annotation in coming phases of OCVE including further support of annotation mechanisms.

*Dingli, Alexiei. 'Annotating different media.' *Knowledge Annotation: Making Implicit Knowledge Explicit*, (Berlin, 2011). Web. 6 May 2016.

Dingli captures and engages deeply with a wide spectrum of annotation theory, practices, and aspects. He asserts the benefit of shared human computation in tackling large projects by pointing to a number of successful collaborative practices, and demonstrates that even manual annotations are enhanced by Web 2.0 technologies. In fact, one chapter is dedicated to manual annotation, where Dingli discusses various related issues, including creator subjectivity and privacy policies. He argues that in order to support the web of the future, there needs to be a shift towards the semantic web, which can offer solutions for the retrieval and use of information. Dingli asserts that many of concepts and the technologies to actualise the semantic web are in place, such as the XML standards, the Resource Description Framework (RDF) and the Web

Ontology Language (OWL). Dingli also discusses semi-automated and automated annotations, where he analyzes various tools, systems, and algorithms to showcase the possibilities that arise from these practices and to point to their limitations. He argues that the redundancy of information on the web, when approached appropriately, can in fact work for the purposes of quality control since the data is gathered from a rich source of varied users with a diverse skillset, and that exploiting the redundancy of web information can result in interesting outcomes.

Frank, Anette, Thomas Bogel, Oliver Hellwig, and Nils Reiter. ‘Semantic annotation for the digital humanities.’ *Linguistic Issues in Language Technology*, 7.8 (2012), n.p. Web. 30 May 2016.

Frank, Bogel, Hellwig, and Reiter investigate the structure of rituals through computational linguistic analysis techniques, looking at new annotation error detection methods for manual annotation and domain adaptation. After reviewing literature on error detection for linguistic annotations, and evaluating semantic processors such as Word Sense Disambiguation, Frame-Semantic labeling, and Coreference Resolution systems, the authors address exploiting multiple layers for consistency control. They study error detection techniques applied onto various levels of discourse and semantic annotations, focusing on consistency and dependencies. Frank et al. process data by manually annotating a test set, and discuss their evaluation measurements and experiments. They describe their work as a primary investigation of mistake detection in automatic Coreference Resolution annotations.

Ginsburg, Mark, and Ajit Kambil. ‘Annotate: a web-based knowledge management support system for document collections.’ *Proceedings of the 32nd Hawaii International Conference on System Sciences*, (Washington, DC, 1999). Web. 30 May 2016.

Ginsburg and Kambil review knowledge management support systems (KMSS), using Annotate as a case study. They start by discussing knowledge management support systems, addressing critical issues with design, and acknowledging the challenges of web-based document KMSS designs. The authors continue to discuss Annotate as a web-based document KMSS, explaining its user interface and its system architecture. Evaluating Annotate, Ginsburg and Kambil explain that one way to enhance social perception of annotation is by broadcasting annotation contribution to the original annotator, which pushes the information faster. They end with the note that their research concentrates on authentication, anonymity, and policy choice that impact the use and effectiveness of a given system.

*Hunter, Jane, Tim Cole, Robert Sanderson, and Herbert Van de Sompel. ‘The Open Annotation Collaboration: a data model to support sharing and interoperability of scholarly annotations.’ *Digital Humanities*, (2010), 175–8. Web. 28 May 2016.

Hunter, Cole, Sanderson, and Van de Sompel discuss the Open Annotation Collaboration project (OAC). In particular, the authors consider the question of interoperability in the scholarly annotations model. This model operates on multiple levels and across various media types, collections, applications and clients; the only common denominator necessary for OAC to function is that both the material and the annotations should be web accessible. The authors highlight various OAC features with the implemented model, which include cross-environment annotations, advanced annotation for humanities scholars across various collections, customization of annotations without decreased interoperability, and automated machine

analysis. The authors argue that this web-centric model enhances existing environments and takes advantage of the possibilities that the web environment has to offer.

Jett, Jacob, Timothy W. Cole, David Dubin and Allen H. Renear. 'Discerning the intellectual focus of annotations.' *Proceedings of Balisage: The Markup Conference*, 17 (2016), n.p. Web. 8 May 2017.

Jett, Cole, Dubin, and Renear begin by stating that annotations on the same object can differ substantially given what type of information they are intending to communicate or preserve. Some annotations may focus on formatting, others on linguistic features, and some may build context. The authors argue that as our scholarly processes are migrated to the web, readers need tools and practices that allow them to carry out a broad range of primitive (in the sense of Unsworth's 'scholarly primitives') activities. Specifically, the authors focus on the challenge of clarifying what is being annotated, or devising a way to make clear what the commentary is focused on. They discuss the importance of expressing annotator intentions and focus, and suggest adding a 'target focus' tag to the WAWG tags 'target' and 'body.' They argue that 'target focus' should be a flexible, extensible framework that allows annotators to fully communicate the intentions of their commentary.

Kaplan, Dain, Ryu Iida, Kikuko Nishina, and Takenobu Tokunaga. 'Slate – a tool for creating and maintaining annotated corpora.' *Annotation of Corpora for Research in the Humanities*, 26.2 (2011), 91–103.

Kaplan, Iida, Nishina, and Tokunaga present Slate, a tool for rich annotation and project-level maintenance. The authors argue that richly annotated corpora enhances research by creating room for more advanced and novel research; however, these types of annotations are harder to maintain since previous research primarily focused on document-level preservation. The authors conduct a case study in a Japanese education environment where the instructors attempt to track second language learners' mistakes in order to use this information to improve their pedagogy. They had initially used Microsoft Excel for this task, which resulted in numerous errors and inconsistencies, making the data difficult to analyze. By uploading this data into Slate, the authors were able to visualise the flow of texts. The platform proved to be much more user-friendly and was, overall, more accurate and easier to maintain. Slate supports a flexible annotation framework that makes it easy to set up and appropriate for different tasks, and allows for the overall maintenance of rich and diverse annotation of corpora.

MacMullen, W. John. 'Annotation as process, thing, and knowledge: multi-domain studies of structured data annotation.' *ASIST Annual Meeting*, (2005), n.p. Web. 30 May 2016
MacMullen explores the concept of annotation and the various meanings it embodies in different contexts. He provides a multifaceted definition of annotation by separating it into three distinct typologies, which include considering annotation as process, thing, and knowledge. MacMullen provides a list of critical questions related to each of these typologies that investigates them within various contexts, including cataloging, music, historical geography, web usability, social networking, government statistics, and biomedical research. The authors found the investigation of the three categories of annotations within these multiple and diverse domains as a productive way of conducting research on a singular level, and also as a means of comparison across these domains. Finally, their results demonstrate that implementing a communicative element into annotation tools supports greater collaboration between users.

Marshall, Catherine C. 'The future of annotation in a digital (paper) world.' *Successes & Failures of Digital Libraries*, (Illinois, 2000), 97–117. Web. 30 May 2016.

Marshall studies the different types of annotation activities involved in real world practices, and surveys a set of existing annotation tools that support these activities. According to Marshall, annotations fall into a wide range of dimensions: form (formal/informal, explicit/implicit); function (reading/writing, extensive/intensive, permanent/transient); and circulation (published/private, institutional/workgroup/individual). Marshall conducts three case studies in order to explore these dimensions: the first focuses on intelligence analysis, the second on K-12 teachers and students in a Web environment, and the last on college students' annotation habits. The tools that are surveyed are more recent versions of original models that have been simplified for general use. Marshall concludes that there is still work that needs to be done in order to accommodate the various types of annotations that are used in different contexts.

McCarty, Willard. 'A network with a thousand entrances: commentary in an electronic age?.' *The Classical Commentary: History, Practices, Theory*. Roy K Gibson and Christina Shuttleworth Kraus, eds. (Leiden, 2002), 359–402.

McCarty's article discusses the practice of commentary in the digital era. He argues that the scope of commentary is characterized by the definition of the word and in historical annotation practices. Central to commentary, for McCarty, is the relationship between the annotation and the object. McCarty acknowledges that commentary mediates objects, as all tools do to some degree. Similarly, McCarty argues that tools materialize ideas and that new ideas arise from the use of tools. Considering the modes of reading are often bound to materiality, McCarty questions why the 'impression of information' has not faltered with the growth of electronic forms. However, McCarty offers that hyperlinking may be an analogous form of interacting to material in a digital realm. In conclusion, McCarty argues that commentary is the way we express knowledge.

McGann, Jerome. 'From text to work: digital tools and the emergence of the social text.' *Romanticism on the Net*. Dino Franco Felluga, eds. (2006), n.p. Web. 30 May 2016.

McGann meditates on the possibilities digital editing affords for instantiations of social textuality. He argues that well designed digital editions comport significant opportunities for the social text, as bibliography scholar D.F. McKenzie championed. In contrast to their more conventional predecessors, digital editions can more accurately represent the dynamic relations inherent to the production and reception of a text. By simulating bibliographical and socio-textual phenomena and employing carefully designed user interfaces that allow for multiple or specialised readings, digital editions can better represent texts as social artifacts and reading as a social act.

Shillingsburg, Peter. *From Gutenberg to Google*. (Cambridge, 2006).

Shillingsburg ruminates on editorial practice and his ideal digital edition: the 'knowledge site.' A knowledge site, in Shillingsburg's conception, is a space where multiple editions of a text could be combined in a straightforward manner. Based on his experience and knowledge of editorial practice and the mandates of the scholarly edition, he deems various elements necessary for a knowledge site, including basic and inferred data, internal links, bibliographical analysis, contextual data, intertextuality, linguistic analysis, reception history, and adaptations.

Furthermore, in keeping with the notion that digital scholarly editions have the capacity to shift the possession of the text to the users, Shillingsburg would ideally include opportunities for user-generated markup, variant texts, explanatory notes and commentary, and a personal note space. Concurrently, Shillingsburg argues that editing is never neutral, but rather an interference in the history and status of the text. The overt acknowledgement of the intrusive nature of editing is imperative for all successful scholarly editions. Since unobtrusive editing and universal texts are non-existent, scholarly editions are better conceived of as select interpretations of texts for specific means.

Siemens, Ray, Alex Garnett, Corrina Koolen, Cara Leitch, Meagan Timney, and ETCL, INKE, and PKP Research Groups. 'Toward modeling the social edition: an approach to understanding the electronic scholarly edition in the context of new and emerging social media.' *Digital Scholarship in the Humanities* formerly *Literary and Linguistic Computing*, 27.4 (2012), 445–61. Web. 30 May 2016.

Siemens, Garnett, Koolen, Leitch, and Timney formulate a vision of an emerging manifestation of the scholarly digital edition: the social edition. The authors ruminate on both the potential and already-realised intersections between scholarly digital editing and social media. For Siemens et al., many scholarly digital editions do not readily employ the collaborative electronic tools available for use in a scholarly context. The authors seek to remediate this lack of engagement, especially concerning opportunities to integrate collaborative annotation, user-derived content, folksonomy tagging, community bibliography, and text analysis capabilities within a digital edition. Furthermore, Siemens et al. conceptually alter the role of the editor—traditionally a single, authoritative individual. The authors envision this position to reflect facilitation rather than didactic authority. A social edition predicated on these shifts and amendments would allow for increased social knowledge creation by a community of readers and scholars, academic and citizen alike.

Smith, Martha Nell. 'Electronic scholarly editing.' *A Companion to Digital Humanities*. Susan Schreibman, Ray Siemens, and John Unsworth, eds. (Oxford, 2004), 306–22.

Smith relies on her experience with the Dickinson Electronic Archives to formulate a conceptual theory of and argument for electronic scholarly editing. For Smith, a significant benefit of the digital scholarly edition is the shift from unilateral authority to networked experience, from the voice of the sole editor to the polyphonic interpretation of multiple readers. Smith acknowledges the various elements that allow for social knowledge production in the digital scholarly edition, including comprehensive inclusion of various artifacts and digital surrogates; ability for multiple editorial theories and consequent readings; engagement of many editorial and readerly intentions and priorities; and social communication via reader's responses, preferences, and tailored readings. Smith concludes that electronic scholarly editing offers the opportunity for more inclusive and democratic knowledge production.

Unsworth, John. 'Scholarly Primitives: what methods do humanities researchers have in common, and how might our tools reflect this?' Presentation at the Symposium on Humanities Computing, London, United Kingdom, 13 May, 2000.

Unsworth's foundational article explores a list of seven 'scholarly primitives,' or self-understood actions that define scholarly work: discovering, annotating, comparing, referring, sampling, illustrating, and representing. While Unsworth did not intend for his list to be exhaustive, they do

provide a relatively holistic and complete picture of scholarly work. Unsworth acknowledges that the ‘scholarly primitives’ are not particular to a single discipline, but rather that, when it comes to things like annotating and comparing, “biologists do it too”. Through the ‘scholarly primitives,’ Unsworth aims to demonstrate how digital humanities tools could enable these functions. He uses the Blake Archive as a case study to showcase how the interface facilitates scholarly work. Overall, Unsworth argues that scholarly activities are poorly supported when it comes to networked electronic data. He urges individuals to invest in the research and creation of scholarly approaches that will support networked tools and resources.

Wolfe, Joanna. ‘Annotation technologies: a software and research review.’ *Computers and Composition*, 19.4 (2002), 471–97. Web.

Wolfe surveys existing annotation models and a number of tools under development, provides relevant research in the field, and proposes a standard for measuring the effectiveness of these tools. She asserts that despite the difficulties involved in sharing annotations in printed texts, it is beneficial for instructors to support this practice as a way of discussing various reading strategies and for students to engage in a larger critical discourse. Wolfe also advocates the benefits of an online environment, since it supports annotation sharing practices, multimedia features, and stylus-based input directly on the digital text. The tools are divided according to the different types of annotations they support, including those that are shared with the author and those that are shared with other readers by both the readers and authors themselves. Wolfe concludes by urging composition researchers to partake in annotation-related research in order to benefit the future design of annotation tools.

Tools

*Bauer, Matthias, Angela Zirker, and Timo Stosser. *Explanatory Annotation: A Research Project in Digital Literary Annotation*. n.d. Web. <<http://www.annotation.es.uni-tuebingen.de>>. 8 May 2017.

Explanatory Annotation is a project out of the University of Tuebingen that focuses on the theory and practice of annotation. Chiefly, the project has three main goals: defining explanatory annotation, developing its theory and disseminating its best practices; investigating the use and influence of explanatory annotation; and establishing explanatory annotation as a field of digital humanities. *Explanatory Annotation* structures and classifies annotations based on a series of categories that describe the purpose and intent of the commentary. These include language, form, context, interpretation, and several others. They have also created a digital environment that displays annotated texts.

Category IV: Group Dynamics and Social Annotation

The objective of the following category is to summarise the critical thinking and research practices on group dynamics and social interaction in the space of digital annotation. These resources interrogate how Web 2.0 has changed the way information is stored, accessed, and interacted with (Cattuto et al.). The movement toward participatory practice has resulted in a gap between theory and reality: while it is relatively undisputed that annotation enhances learning, annotation tools are designed in an ill-effective manner (Wolfe). The authors in this category hone in on the various functionalities of annotation software that assist in building community and facilitating virtual collaboration. Themes of community engagement, creation, sharing, comprehension, and learning outside the classroom tie these publications together. Many of the

authors take up individual case studies to illustrate their arguments. Such exemplars include Diigo (a web annotation plug-in), He Do the Police in Different Voices (a digital annotation project), and NewRadial (an INKE annotation and networking tool). As these models illustrate, social annotation practices can take place across a variety of platforms intended for a multitude of scholarly or personal endeavours. The tools in this category are mostly web-based environments. While their mandates fluctuate between pedagogical tools to freeform browser annotation platforms, they are all interested creating a common space for users to share their commentary.

Articles

*Agosti, Maristella, Nicola Ferro, Ingo Frommholz, and Ulrich Thiel. ‘Annotations in digital libraries and collaboratories — facets, models and sage.’ *Proceedings of the 8th Conference on Research and Advanced Technology for Digital Libraries*. Rachel Heery and Liz Lyon, eds. (Berlin, 2004), 244–55. Web. 6 May 2016.

Agosti, Ferro, Frommholz, and Thiel discuss beneficial annotation practices across the fields of digital libraries and collaboratories. The authors attempt to draw connections between the objectives of digital libraries and the outcomes of annotation practice. They argue that annotations expand the information resources managed by libraries, and support community access and engagement with resources in a personalised way. The authors categorically define annotations from three different standpoints: annotations as metadata, annotations as content, and annotations as dialogue acts. Agosti et al. propose an Entity-Relationship schema for modeling annotations based on the highlighted properties of this scholarly engagement.

*Agosti, Maristella, Hanne Alberchtsen, Nicola Ferro, Ingo Frommholz, Preben Hansen, Nicola Orio, Emanuele Panizzi, Annelise Mark Pejtersen, and Ulrich Thiel. ‘DiLAS: a digital annotation service.’ *Proceedings of Annotation for Collaboration -- a Workshop on Annotation Models, Tools and Practices*, (2005), n.p. Web. 6 May 2016.

Agosti, Alberchtsen, Ferro, Frommholz, Hansen, Orio, Panizzi, Pejtersen, and Thiel explore how to incorporate annotations in digital libraries and collaboratories in order to inform the designing of a service that can facilitate annotation in this discipline. Agosti et al. designed and administered a usability study in order to inform their tool design. As the authors discuss, the objective of this study was to collect data on potential expert users, and their needs, practices, workflows, and goals. Agosti et al. found that the study participants collaborated more often than they anticipated—in fact, participants collaborated on nearly every task they performed. Annotation tools were used to track project progress and were attached to a range of media types. These results inspired the research team to enhance social infrastructure and user interaction through their annotation tool. In the balance of the article, the authors detail the various features, design, and evaluation of the tool, based on user needs and participation.

Bao, Shenghua, Xiaoyuan Wu, Ben Fei, Guirong Xue, Zhong Su, and Yong Yu. ‘Optimizing web search using social annotations.’ *Proceedings of the 16th International Conference on World Wide Web*, (New York, 2007), 501–10.

Bao, Wu, Fei, Xue, Su, and Yu discuss social annotation in the context of web searching, claiming that the accuracy of web search results are optimised through the use of ranked social annotations. The authors present an overview of related work in the field and then move to introduce social annotation and web searching by focusing on similarity ranking (term-matching

and social), page quality estimation, and dynamic ranking. They discuss the experiments results by providing a brief explanation of the Delicious data, evaluating annotation similarities and SPR (SocialPageRank) results, and looking at the dynamic ranking with social annotation. Bao et al. affirm that the effectiveness and accuracy of web searching can benefit from social annotations. However, they acknowledge that several issues still need to be addressed, including annotation coverage, annotation ambiguity, and user spam. The authors conclude by listing the contributions of their work to three different proposals: studying the use of social annotations to improve the quality of web search, creating a SocialSimRank algorithm to measure the association among annotations, and integrating a SocialPageRank algorithm to measure the static ranking of a web page according to corresponding social annotations.

*Boujut, Jean-Francois. 'User-defined annotations: artefacts for coordination and shared understanding in design teams.' *Journal of Engineering Design*, 14.4 (2003), 409–19. Web. 6 May 2016.

Boujut addresses the role of annotation in collaborative design and product representation. According to the authors, existing computer-aided systems (CAD) are poorly equipped for representing technical information about artefacts (including design, procedures, requirement lists) and for facilitating collaborative design work, which are often the two central components of cooperative work environments. The authors demonstrate how the creation of specific symbols that are associated with unique product information can be implemented into the CAD model as the basis of proposing certain modifications. The symbolic annotations are assigned meaning and become a tool for knowledge creation and mobilization, as well as the platform for cooperation that has a tangible effect on the manufacturing process. The process described in this article facilitates the collaborative aspect of design work by redirecting it to tools that foster knowledge creation.

Brooke, Julian, and Adam Hammond. *He Do the Police in Different Voices*. n.d. Web. <<http://hedothepolice.org/>>. 30 May 2016.

The website He Do the Police in Different Voices was specifically created for the exploration of T.S. Eliot's notoriously complex poem, *The Waste Land*. So far only used in a classroom setting, He Do the Police in Different Voices encourages students to annotate *The Waste Land* for voice. He Do the Police in Different Voices incorporates versions of *The Waste Land* that have already been marked up for voice and automated through an algorithm. The website demonstrates the various ways collaborative annotation can instigate social knowledge creation; in this case, new insights and explorations are garnered by focusing group work on a shared text.

Cattuto, Ciro, Alain Barrat, Andrea Baldassarri, Gregory Schehr, and Vittorio Loreto. 'Collective dynamics of social annotation.' *CrossMark*, 106.26 (2009), 10511–15. Web. 30 May 2016.

Cattuo, Barrat, Baldassarri, Schehr, and Loreto argue that the rise and development of Web 2.0 has drastically affected the way information is stored, accessed, and interacted with online. Networks of resources, users, and metadata have become central to our information society; many popular web tools are now leveraging these user-driven information networks by creating platforms for social annotation and collaborative tagging. Cattuo et al. turn to del.icio.us and BibSonomy as case studies of social bookmarking sites that have enjoyed widespread and extensive popularity as hubs of collaborative tagging. Given the explosive and exponential

growth of these types of information systems, the authors suggest that a rationalization and modeling framework should be developed in order to streamline the uncoordinated actions of the user community.

*Chamberlain, Jon, Massimo Poesio, and Udo Kruschwitz. 'Phrase Detectives: a web-based collaborative annotation game.' *Proceedings of the International Conference on Semantic Systems*, (2008), 42–9. Web. 6 May 2016.

Chamberlain, Poesio, and Kruschwitz discuss the development of an online game platform to aid in the annotation of texts. The authors point out that the greatest obstacle for automatic, computational extraction of semantic information is having an annotated corpus large enough to train a machine for this task. Their project, ANAWIKI, experiments with an innovative approach to large-scale corpus annotation by using a game-like interface in order to engage users. The game, *Phrase Detectives*, is designed to teach non-expert users how to annotate text. The objective of the game is for the user to identify relationships between short words and phrases. The game uses a detective genre to motivate engagement and is linked to social media platforms, like Facebook, to increase accessibility.

*Dingli, Alexiei. 'Annotating different media.' *Knowledge Annotation: Making Implicit Knowledge Explicit*, (Berlin, 2011). Web. 6 May 2016.

Dingli captures and engages deeply with a wide spectrum of annotation theory, practices, and aspects. He asserts the benefit of shared human computation in tackling large projects by pointing to a number of successful collaborative practices, and demonstrates that even manual annotations are enhanced by Web 2.0 technologies. In fact, one chapter is dedicated to manual annotation, where Dingli discusses various related issues, including creator subjectivity and privacy policies. He argues that in order to support the web of the future, there needs to be a shift towards the semantic web, which can offer solutions for the retrieval and use of information. Dingli asserts that many of concepts and the technologies to actualise the semantic web are in place, such as the XML standards, the Resource Description Framework (RDF) and the Web Ontology Language (OWL). Dingli also discusses semi-automated and automated annotations, where he analyzes various tools, systems, and algorithms to showcase the possibilities that arise from these practices and to point to their limitations. Dingli argues that the redundancy of information on the web, when approached appropriately, can in fact work for the purposes of quality control since the data is gathered from a rich source of varied users with a diverse skillset, and that exploiting the redundancy of web information can result in interesting outcomes.

*Ellis, Sean, and Dennis Groth. 'A collaborative annotation system for data visualization.' *Proceedings of the Working Conference on Advanced Visual Interfaces*. (New York, 2004), 411–14. Web. 30 May 2016.

Ellis and Groth demonstrate Collaborative Annotations on Visualizations (CAV), a system designed to facilitate the creation and collection of annotations for visual data in a tablet medium. Previously, collaborative work on dynamic visual data has been carried out by working in a static non-digital medium, such as with paper print-outs, or by gathering around one electronic device, and has therefore been inefficient in supporting productive collaboration. CAV remedies the limitations of previous practices by providing a framework that supports working with electronic visualizations from remote workspaces, and annotating visual data with

the use of digital ink. It also supports textual and audio annotations. These annotations are anchored to the frames they describe, and can be browsed in context or separately.

Gazan, Rich. 'Social annotations in digital library collections.' *D-Lib Magazine*, 14.11/12 (2008), n.p. Web. 6 May 2016.

Ideally, Gazan argues, annotations transport scholarly research from a solitary pursuit into a collaborative learning effort. The integration of Web 2.0 philosophy with annotation means that users can now create, share, and interact through their commentary. Despite this promising advancement, the majority of digital libraries still operate on an expert model that privileges subject experts over users in the creation of digital content. In fact, Gazan argues, very few library systems encourage user content creation of their information architecture. Gazan proposes that opening the library system to invite Web 2.0 annotation could help to serve the larger goal of facilitating user information seeking needs. He draws on Answerbag as an example. Overall, Gazan asserts that institutional barriers are preventing the adoption of social annotation practices; the biases that inform current standards should be questioned in light of newer information models.

Hendry, David, J.R. Jenkins, and Joseph F. McCarthy. 'Collaborative bibliography.' *Information Processing & Management*, 42.3 (2006), 805–25. Web. 6 May 2016.

Hendry, Jenkins, and McCarthy provide an overview of the type of bibliographies published on the web currently, and expand the more traditional view of bibliography to encompass participatory practices. By providing a conceptual model for the infrastructure of these practices, the authors demonstrate the process of producing and supporting these collections, both on a theoretical level and through a case study. The ideal result of these participatory policies would involve an environment with collaborative decision-making, a visible workflow and collective shaping of it, and audience discussions. However, they conclude that the realization of this model would require a significant investment into systems development and is not yet sustainable.

Hong, Yanhui, Tiandi Chen, Kang Zhang, and Lifeng Sung. 'Personalized annotation for mobile photos based on user's social circle.' *MultiMedia Modeling*, (2016), 76–87.

Hong, Chen, Zhang, and Sung address the problem of personal photo management and organization by suggesting that data collected from a user's social circle could be leveraged to automatically sort and categorise images. The authors briefly review related work on topics such as personalised annotation and social annotation before presenting their proposed framework. Hong et al. argue in favour of the use of automated systems that can handle both image label generation and image annotation. Both tasks take advantage of social network user data to correctly categorise photos. The authors test their methods on a large ReSEED dataset. The results yielded from this experiment show the system to be effective.

*Hunter, Jane, Tim Cole, Robert Sanderson, and Herbert Van de Sompel. 'The Open Annotation Collaboration: a data model to support sharing and interoperability of scholarly annotations.' *Digital Humanities*, (2010), 175–8. Web. 28 May 2016.

Hunter, Cole, Sanderson, and Van de Sompel discuss the Open Annotation Collaboration project (OAC). In particular, the authors consider the question of interoperability in the scholarly annotations model. This model operates on multiple levels and across various media types,

collections, applications and clients; the only common denominator necessary for OAC to function is that both the material and the annotations should be web accessible. The authors highlight various OAC features with the implemented model, which include cross-environment annotations, advanced annotation for humanities scholars across various collections, customization of annotations without decreased interoperability, and automated machine analysis. The authors argue that this web-centric model enhances existing environments and takes advantage of the possibilities that the web environment has to offer.

Jiun-Chi, Jan, Chih-Ming Chen, and Po-Han Huang. 'Enhancement of digital reading performance by using a novel web-based collaborative reading annotation system with two quality annotation filtering mechanisms.' *International Journal of Human-Computer Studies*, 86 (2016), 81–93. Web. 6 May 2016.

Technological advances, especially in digital publication, have sparked a growing population of online readers. Jan, Chen, and Huang argue that this movement has spurred the creation of digital annotation tools—such as Diigo—to assist the efficiency of comprehension tasks performed by online readers. They argue that collaborative annotation tools promote reading effectiveness as well as facilitate group reading. The authors propose a web-based, collaborative reading annotation system that combines group annotation, annotation filtering, database access, and annotation evaluation. This platform would facilitate the creation, modification, and deletion of annotations; selection of 'favourite' annotations; annotation in either public or private mode; and commenting on annotations.

Johnson, Tristan E., Thomas N. Archibald, and Gershon Tenenbaum. 'Individual and team annotation effects on students' reading comprehension, critical thinking, and meta-cognitive skills.' *Computers in Human Behavior*, 26.6 (2010), 1496–507.

Johnson, Archibald, and Tenenbaum assert that possessing advanced written language skills is critical for students entering the workplace. Colleges and universities are attempting to implement new interventions that help students become more proficient verbal learners. The authors' main objective in this article is to interrogate how students may gain essential skills for academic success through the use of social annotation. The team conducted various studies to explore the strategies and effects of social annotation on learning outcomes. The participants were asked to engage with various models of highlighting, annotating, and reflecting in individual and group tasks. Overall, the results of the studies showed that individual annotation did not have a strong impact on their learning. However, group annotation had a definite impact on learning comprehension and metacognition.

*Mu, Xiangming. 'Towards effective video annotation: an approach to automatically link notes with video content.' *Computers and Education*, 55.4 (2010), 1752–63. Web. 28 May 2016.

Xiangming describes a video annotation tool called Interactive Shared Education Environment (ISEE) that fosters distant collaborative learning environments. The tool is aimed at providing optimal approaches to video annotation by introducing a video based learning system. The author describes two case studies: a comparison study between the performance of individuals who are using the Smartlink function and those who are not, and a follow-up eye-tracking study. The Smartlink function synchronises video annotations with video progression. The results demonstrate that Smartlinks enhance learning activities since they allow users to write improved video annotations by providing appropriate context. This leaves them more time to focus on

critical activities rather than video control. The eye-tracking study also shows that Smartlink ISEE improves the effectiveness of learning by leaving more space to focus on content-based activities.

Plangprasopchok, Anon, and Kristina Lerman. ‘Modeling social annotation: a Bayesian approach.’ *ACM Transactions on Knowledge Discovery from Data*, 5.1 (2010), n.p. Web. 6 May 2016.

Plangprasopchok and Lerman argue that applying topic modeling methods to user-generated metadata can assist in resolving the challenges of data sparseness and noise that plague social annotation applications. The model that the authors suggest is optimally suited to deal with socially constructed metadata, given the data’s high degree of noise, ambiguity, and diversity. By breaking the social annotation system into its three component parts—resources, users, and metadata—Plangprasopchok and Lerman evaluate the effectiveness of the Interest Topic Model (ITM) and Latent Dirichlet Analysis (LDA) on synthetic and real-world data. The authors find that employing the probabilistic model that takes into account the preferences of the users who are creating the metadata is most effective in disambiguating tags and learning accurate topic descriptions.

Robert, Charles Abiodun. ‘Annotation for knowledge sharing in a collaborative environment.’ *Journal of Knowledge Management*, 13.1 (2007), 111–9. Web. 6 May 2016.

Robert explores different methods of knowledge sharing. He defines knowledge as the insertion of human interpretation into an information source. The author argues that while several attempts have been made to encourage annotation at the individual level, his research focuses on annotation for the purpose of knowledge sharing. Robert presents four models of knowledge sharing: moderated sharing; symbiotic sharing; propagated sharing; and transitional sharing. He acknowledges that these methods are rarely exhibited in isolation but that, more commonly, users will mix two or more of the methods. Robert demonstrates, through his argument, that annotation is not just a product of its source but also of the individual creators/annotators involved.

*Saklofske, Jon, and Jake Bruce, with the INKE Research Group. ‘Beyond browsing and reading: the open work of digital scholarly editions.’ *Scholarly and Research Communication*, 4.3 (2013), n.p. Web. 28 May 2016.

Saklofske and Bruce ask: ‘How can digital scholarly editions take full advantage of environmentally-generated opportunities to focus on process, collaboration, and distributed control without losing the traditional affordances that make an edition “scholarly?”’ This question is explored through a case study of the Implementing New Knowledge Environments (INKE) NewRadial prototype. As a virtual environment, this prototype reimagines the scholarly edition as a workspace rather than a stagnant object. The authors eschew the isolated print-based technology that leaves readers stranded in favor of adopting a model that facilitates scholarly debate and exchange. NewRadial displays three main types of objects: nodes, edges, and groups. The nodes are image icons that can be sorted into user-generated groups or radials. Individual documents or groups can be connected to other documents or groups by an edge in order to indicate a significant relationship. Saklofske and Bruce argue that NewRadial takes advantage of web-based affordances by allowing users to comment on their collections.

*Su, Addison Y.S., Stephen J.H. Yang, Wu-Yuin Hwang, and Jia Zhang. 'A Web 2.0-based collaborative annotation system for enhancing knowledge sharing in collaborative learning environments.' *Computers and Educations*, 55.2 (2010), 752–66. Web. 6 May 2016.

Su, Yang, Hwang, and Zhang investigate how students have used Personalized Annotation Management System (PAMS) 2.0 (a Web 2.0 collaborative annotation system), for sharing their own annotations in a collaborative learning context. They conduct a quasi-experiment, analyze the results, and then discuss how PAMS 2.0 was built, followed by a description of the methodology, and the results and findings. The authors find that annotation systems help enhance student learning outcomes. Sharing activities have positively affected students' achievement, and have increased collaboration, at least among more motivated students. They conclude that learning achievements are influenced by the quantity of annotations, and that further research needs to be conducted in order to explore factors that could influence instructional tools.

*Wolfe, Joanna. 'Annotation technologies: a software and research review.' *Computers and Composition*, 19.4 (2002), 471–97. Web.

Wolfe surveys existing annotation models and a number of tools under development, provides relevant research in the field, and proposes a standard for measuring the effectiveness of these tools. She asserts that despite the difficulties involved in sharing annotations in printed texts, it is beneficial for instructors to support this practice as a way of discussing various reading strategies and for students to engage in a larger critical discourse. Wolfe also advocates the benefits of an online environment, since it supports annotation sharing practices, multimedia features, and stylus-based input directly on the digital text. The tools are divided according to the different types of annotations they support, including those that are shared with the author and those that are shared with other readers by both the readers and authors themselves. Wolfe concludes by urging composition researchers to partake in annotation-related research in order to benefit the future design of annotation tools.

Yang, Stephen J.H., Irene Ya-Ling Chen, and Norman W.Y. Shao. 'Ontology enabled annotation and knowledge management for collaborative learning in virtual learning community.' *Journal of Educational Technology & Society*, 7.4 (2004), 70–81. Web. 6 May 2016.

Yang, Chen, and Shao discuss virtual learning communities (VLCs). The authors define VLCs as digital environments where geographically dispersed individuals are able to accomplish collaborative learning goals. VLCs are designed to facilitate co-authorship, educational interaction, and the sharing of information between participants. Part of successful knowledge management in a VLC is the written or symbolic articulation of information. Yang, Chen, and Shao share an ontology they developed in order to aid in annotation and knowledge management. The authors summarise research on annotation and conclude that its benefits include extended learner attention, increased discussion, better organization, and concrete indexing. The authors argue that annotation should be established in a machine-readable format in order to facilitate computer processing. Yang, Chen, and Shao suggest that future research should focus on universal accessibility.

*Yang, Stephen J.H., Jia Zhang, Addison Y.S. Su, and Jeffery J.P. Tsai. 'A collaborative multimedia annotation tool for enhancing knowledge sharing in CSCL.' *Interactive Learning Environments*, 19.1 (2011), 45–62. Web. 30 May 2016.

Yang, Zhang, Su, and Tsai focus on computer based collaboration techniques that allow individuals to work together without physically being in the same place. The authors argue that computer technologies enhance interactions, communications, coordination, and knowledge sharing. Annotation is a key part of knowledge sharing because it enables participants to explore and exploit valuable ideas. The authors discuss the application of web technologies in building social software that facilitates knowledge sharing. Yang et al. assert that effective web-based annotation tools should be able to facilitate online discussions between multiple users. The authors conduct a case study on the annotation platform PAMS 2.0 and set specific learning outcomes, which indicated that learning is enhanced through personal annotations.

Tools

**Annotary*. 10 September 2012. Annotary, Inc. Web. 6 May 2016. <<https://annotary.com>>. Annotary is a Google Chrome extension that allows users to save web pages, highlight sentences and paragraphs, take notes, and share their annotations with other users. Annotary uses a bookmarking feature which facilitates the categorization of online resources into appropriate collections. It is a free tool that supports an unlimited number of bookmarks and annotations. Annotary also supports collaboration by allowing users to browse and contribute to each other's collections. With Annotary, users can enhance their project management capabilities, as well as their analyses, as it provides them with the necessary tools and options.

**Annotum*. 21 October 2015. Solvitor LLC. Web. 22 February 2016. <<http://annotum.org/>>. Annotum is a simple, web-based, content authoring tool that facilitates the creation and editing of articles within a system that allows users to submit, review, and publish material. Annotum strives to replicate the simple, rich, open access model of WordPress, and attempts to enhance the system by supporting article review workflows, version comparison, and simultaneous work by multiple authors. Annotum supports exporting to PDF and XML formats. In addition, it enhances scholarly publishing by facilitating referencing, citation, tables, figures, and auto-generation and referencing of CrossRef DOIs.

**BasKet Note Pads*. 30 Septemeber 2010. KDE Project. Web. 22 February 2016. <<http://basket.kde.org/>>.

BasKet Note Pads is a multi-purpose note taking application. BasKet Note Pads facilitates the collection of data, the organization of annotations, tagging, data sharing, and the import of notes from other applications. The tool manages different types of information, including lists, links, and pictures. User data can be openly shared or password protected. BasKet Note Pads presents the user with an interface that can serve as a personalised and tailored hub for their online research. The hierarchical display of the tool's options allows the user to navigate through the tasks and features easily.

*Bruce, Jake, Jon Saklofske, and Rick Giles. *New Radial*. 24 September 2013. INKE Group. Web. 22 February 2016. <<http://inke.acadiau.ca/newradial/>>.

NewRadial is a web-based environment designed to facilitate humanities research and collaboration. The tool allows users to organise, gather, search, and annotate digital content in a visual manner by creating circular networks. NewRadial functions as a dynamic workspace by

allowing users to manipulate their data on screen and create radials, or groupings, of objects based on their research interest. NewRadial is designed to be a space where scholars can exchange knowledge and debate concepts through centralised and mapped annotation on collections.

*Call, Luke A. *OneModel*. 8 April 2016. Web. 6 May 2016. <<http://www.onemodel.org/1/e-9223372036854622523.html>>.

OneModel is an open access text-based tool for knowledge organization, file management, collaborative annotation, and import and export of texts. OneModel allows users to take notes, arrange annotations in a hierarchy, link internal commentary, and make personalised lists. Although OneModel does not currently support mobile use, the developers aim to integrate this feature in a future platform update.

Chatterati. 25 September 2012. Chatterati.in. Web. 6 May 2016.

<<https://chrome.google.com/webstore/detail/chatterati/gcofjgcjnfblnifodeniggbbibpidbhcg?hl=en>>.

Chatterati is a browser plugin for Google Chrome that facilitates user commentary on web pages. The platform employs a scoring scheme that permits users to rate each other's comments in order to ensure that spam or off-topic comments are voted down, eventually resulting in non-display. By providing an outlet for this type of user-driven feedback, Chatterati motivates the participation of engaged, conscientious users who contribute high quality ideas to Internet-based discussions.

Delicious. *Delicious*. n.d. Delicious Media, INC. Web. 19 May 2016. <<https://delicious.com/>>.

Delicious is primarily a social bookmarking site. Users can bookmark various links, websites, or articles on the Internet and share these bookmarks with other Delicious users. Although the default setting is public sharing, users can choose to archive bookmarks privately. The tool facilitates folksonomy tagging by allowing users to tag their selected bookmarks with any desirable metadata terms. Delicious makes bookmarking and organizing resources quick and easy.

**Diigo*. n.d. Diigo, Inc. Web. 9 May 2016. <<https://www.diigo.com/>>.

Diigo specifically focuses on enhancing e-reading; it is best conceived of as a platform for collecting and managing research. Diigo enables a variety of online practices from social bookmarking to comprehensive search to multi-user annotation. This tool's strength lies in its double role as a collaborative research platform and a social knowledge sharing site. Users can perform their own research, and use Diigo to manage and facilitate those practices. They can also engage with other users via the built-in social network and repository of shared bookmarks. In this way, Diigo encourages social knowledge by catering to the individual needs of various users and providing an online forum for inter-user interaction.

*Duncombe, Stephen, and Thomas More. *Open Utopia*. 5 December 2012. Web. 16 June 2017. <<http://www.theopenutopia.org>>.

Open Utopia is an open edition of Thomas More's 1516 text *Utopia*. Developed by Stephen Duncombe, *Open Utopia* allows readers to interact with the text on a variety of levels – reading, listening, copying, gaming, and annotating. Partnering with The Institute for the Future of the

Book, *Open Utopia* hosts a social edition of the text where readers can annotate and share their thoughts on the work, and engage with what other readers have commented. This social edition also preserves the marginal notes from the original 1516 edition – added by More and his friends. These remarks have often been excluded from scholarly editions, but Duncombe revives the editorial tradition by including them in his social edition.

**eLaborate*. 11 March 2016. Huygens ING- KNAW. Web. 27 May 2016.

<<http://elaborate.huygens.knaw.nl/>>.

eLaborate is an online work environment that allows users to upload scanned documents, and transcribe and annotate texts. Users can also publish the annotated transcription of their work online in text form and make it available for other users. This creates a collaborative, user-generated database of text transcriptions and commentary. eLaborate supports both scholarly and personal use of their tool and hosts work environments to cater to the needs of both user groups.

*Glass, Geof. *Marginalia*. 7 October 2015. Web. 27 May 2015. <<http://webmarginalia.net/>>.

Marginalia is an open source Javascript web annotation system that allows users to highlight text and write notes. It is primarily designed with education, collaboration, and online discussion in mind, but could be easily adapted for individual annotation practices. As a web annotation system, Marginalia integrates with learning management systems like Moodle. The website on which the tool is found has a sandbox option that allows users to test the tool before downloading it, and a pedagogy section that explains how it can be used to enhance educational practices and enrich online discussion.

**Google Drive*. Google. n.d. Web. 6 May 2016. <<https://drive.google.com>>.

Google Drive is a browser-based application for document storage, creation, and sharing. Over thirty file types can be saved, and common file types (documents, presentations, spreadsheets) can be created in the Google Drive environment. In addition to allowing users to develop and save files online, Google Drive also makes collaboration easy, as it enables multiple users to chat, comment, and work on the same document simultaneously. The documents also contain a versioning system for users to review specific changes or revert back to previous versions.

KDE group at the University of Kassel, DMIR group at the University of Würzburg, and L3S Research Center. *BibSonomy*. 10 March 2016. Web. 19 May 2016.

<<http://www.bibsonomy.org>>.

BibSonomy is a social bookmarking and publication sharing system for managing literature lists. Users can store and organise resources in a public framework, as well as tag and annotate entries with descriptive, user-determined terms. All publications are stored as BibTeX files and can be exported in a variety of formats, including EndNote and HTML. This tool is useful for students and researchers who are interested in organizing their resources and in collaborating with others on similar topics of interest.

Mendeley. n.d. Mendeley. Web. 6 May 2016. <<http://dev.mendeley.com>>.

Mendeley is a free reference management system and an academic social network. Users can generate bibliographies, collaborate, and import resources. The program can be accessed as a desktop, iPhone, or iPad application. While the standard tool is free and provides users with 2 GB of web storage space, additional storage can be purchased. The tool also includes a PDF

viewer where users can add notes and highlight text. Citations can be exported as BibTeX and transferred into several word processor formats. The social networking features include newsfeeds, comments, and profile pages. User statistics about papers, authors, and publications may also be viewed.

*Net 7. *Pundit*. 29 October 2015. Pundit LAB. Web. 22 February 2016. <<http://thepund.it/>>. Pundit is an open source annotation tool that allows users to comment, bookmark, highlight, or tag web pages. One of its distinctive features is the option to create semantically structured data in the form of annotations that can be reused, therefore fostering collaborative and social creation and dissemination of knowledge. This functionality is carried out by adopting linked data standards that allows users to connect various sections of a text with each other, and encourages more effective web navigation. User work can be accessed through a central searchable dashboard. This tool is primarily designed for enhancing research, work, and study practices.

**NowComment*. n.d. Fairness.com LLC. Web. 6 May 2016. <<http://nowcomment.com/>>. NowComment is a free, fast, feature-rich online tool that allows users to have discussions and collaborate on their work. NowComment allows users to comment, sort, skim, and create documents which they can share with groups. The commenting and reviewing features support personalised annotation and track changes. NowComment is designed to adapt to multiple professional settings and usages, including education, business, government, public policy, law, and personal use.

*Open Knowledge Foundation Labs. *TEXTUS*. 22 March 2015. Web. 10 May 2016. <<http://textusproject.org/>>. TEXTUS is an open source reading environment that aims to encourage and enhance professional, online discussion. TEXTUS is designed for working with text and enabling students to collaborate and share ideas on a user-friendly platform. TEXTUS allows users to cite and annotate documents collaboratively or individually. Recently, TEXTUS has been divided into four related, but unique, components: Textus Formatter, a tool that converts standard text; Textus Viewers, a Javascript text display; Textus Wordpress, a plugin for transform TEXTUS tools into Wordpress format; and Textus API, an API creation platform.

*Pyysalo, Sampo. *Brat Rapid Annotation Tool*. 8 November 2012. Crunchy Frog. Web. 22 February 2016. <<http://brat.nlplab.org/>>. The Brat Rapid Annotation Tool (Brat) is a web-based platform for text annotation. Brat is designed to create structured annotations instead of freeform notes so that the computer can automatically process and interpret the user-generated commentary. The tool permits users to devise text span annotations, relation annotations, and any number of annotations sharing the same roles, such as defining material. Working within this constrained framework, Brat also allows users to specify the details of an annotation using attributes. Brat is useful for many different tasks, including entity mention detection, event extraction, and dependency syntax.

*Romano, Tom. *Madcow*. 11 October 2013. 4impact. Web. 22 February 2016. <<http://www.web-annotations.com/ipages/>>. Madcow is a visual interface for annotating web pages. It is a multimedia annotation system that plugs into a standard web-browser. Madcow has a sophisticated annotation function that allows

users to annotate multiple objects in different formats and to display the annotations in a customizable way (insertions, comments, questions, integrations, and announcements). Madcow also allows users to upload and save multimedia files within the annotation itself. Madcow is designed for collaborative practices and supports annotation distribution and circulation in a web environment. Further, the annotations themselves can be turned into discussion threads, thereby promoting online discussion and collaboration. Users can create private groups or allow the tool access to their information in order to perform candidate matching with users that share similar interests.

*University of Hamburg. *CATMA*. Version 4.2.0. Web. 10 May 2016. <<http://catma.de>>. CATMA is a web-based text analysis and literary research application that permits scholars to work collaboratively by exchanging analytical results online. The application boasts a number of features: users can apply analytical categories and tags, search the text using Query Builder, set predefined statistical and non-statistical analytical functions, visualise text attributes and findings, and share documents, tagsets, and markup. CATMA consists of three modules: the Tagger for markup and tagging of a text, the Analyzer for queries and a variety of text analysis functions, and the Visualizer to create charts and other visualizations of analysis results. This tool is aimed at users with interest in textual analysis and literary research.

*Wright, Jacob, and Derek Andriesian. *MyStickies*. n.d. Web. 6 May 2016. <<https://www.mystickies.com/>>.

MyStickies is a tool that allows users to add digital sticky notes on websites and web pages. It provides a robust interface that facilitates the browsing, searching, sorting, and editing of user notes. Users can mark up a page however they would like, and in accordance with their purposes, allowing for an efficient retrieval of the annotations made and notes taken. Described as ‘bookmarks on steroids,’ MyStickies enhances the bookmarking practice of saving the title and URL by allowing users to generate their own commentary on the resource.

Zurb. *Bounce*. n.d. ZURB. Web. 6 May 2016. <<http://www.bounceapp.com/>>.

Bounce attempts to improve prototype development via an open, shared feedback structure. As a ZURBapp, Bounce was created to facilitate productive, collaborative design work. Specifically, Bounce was designed for colleagues to provide each other with feedback on ongoing projects. Users can upload an image or submit a URL and comment directly onto this file. In the framework of collaborative annotation, Bounce could ostensibly be used to easefully share basic notations on a shared document. The user may also copy and paste a Bounce-generated URL for dissemination after commenting on a page.

Category V: Bibliographic Reference/Metadata/Tagging

This category includes tools that facilitate tagging and annotation of documents and websites, and the creation of various types of metadata. The selected case studies discuss and evaluate the features of the tools at hand. This category also provides a range of articles that address bibliographic referencing issues, including domain ontologies, bookmarking, automatic annotation, and search queries. As a practice, bibliographic metadata annotation is growing alongside the proliferation of digital work in the humanities, especially with the increasing interest in digitizing books—a practice which yields various types of data and metadata that need to be annotated and organised in order to be useful. It also extends to include the bibliographic

tagging of websites and web pages, and points to available tools that allow users to semantically annotate resources. This is considered a central practice since folksonomies have a remarkable effect on user/web interaction. In this category, bookmarking tools, such as BibSonomy, are treated as a means of bibliographic tagging. Relational data and automatic linking are also discussed as a means for information extraction and processing. Furthermore, Michael G. Noll and Christoph Meinel identify three types of metadata that affect social bookmarking: social annotations, anchor text, and search queries (2008).

Articles:

Al-Khalifa, Hend S., and Hugh C. Davis. 'FolksAnnotation: a semantic metadata tool for annotating learning resources using folksonomies and domain ontologies.' *IEEE Innovations in Information Technology*, (2006), 1–5. Web. 30 May 2016.

Al-Khalifa and Davis question how folksonomies are able to support semantic web resource annotation in the realm of education. They suggest that folksonomies have been gaining popularity, which affects how users interact with the web. Al-Khalifa and Davis present a review of relevant research, outline the three ontologies used, describe the system architecture of their prototype tool, and present an evaluation of it while summarizing the ongoing research. They conclude that folksonomies guided by domain ontologies can generate semantic metadata, and propose a plan for evaluating the performance of this type of metadata.

Association for Computers and the Humanities. 'Digital humanities questions & answers.' *Associations for Computers and the Humanities*, (n.d.), n.p. Web. 30 May 2016.
<<http://digitalhumanities.org/answers/>>.

Digital Humanities Questions & Answers, known simply as DHAnswers, is an online question and answer board for digital humanities practitioners. Questions are appropriately tagged as they are asked, thus creating a collection of tags for others to navigate and ideally find answers to their own relevant questions. DHAnswers provides an excellent example of how folksonomy tagging can be harnessed by a specific community in order to foster social knowledge creation on a pre-determined subject. Hence, it highlights the importance of annotations beyond individual use.

*Bernava, Carlo, Giacomo Fiumara, Dario Maggiorini, Alessandro Provetti, and Laura Ripamonti. 'RDF annotation of second life objects: knowledge representation meets social virtual reality.' *Computational and Mathematical Organization Theory*, 20.1 (2014), 20–35. Web. 28 May 2016.

Bernava, Fiumara, Maggiorini, Provetti, and Ripamonti present an application for the annotation of graphical objects in the web-based game environment Second Life (SL). This is done by implementing Primitives (Prisms)—the building blocks of the virtual environment—that use folksonomy tagging in the form of semantic social tags generated by the Resource Description Framework (RDF). It also allows users to contribute to the folksonomy by providing annotations. This project aims to create a knowledgebase that would be accessible and readable by both users and applications in SL. SL is a fruitful environment to conduct folksonomy tagging because it has a large community that fosters the development of social tags and builds the meaning of an object over time.

Borrego, Angel, and Jenny Fry. 'Measuring researchers' use of scholarly information through social bookmarking data: a case study of BibSonomy.' *Journal of Information Science*, 38.3 (2012), 297–308.

Borrego and Fry discuss the possibility of using bookmarking services in order to measure how academic researchers use BibSonomy for published and unpublished information. The authors outline various questions that revolve around types of sources, types of information resources, and data incorporation into existing approaches in order to guide their studies. Borrego and Fry show that journal articles are the most bookmarked type of sources, followed by conference proceedings. In their discussion, they answer the questions asked at the beginning of the article, and conclude that their results confirm that social bookmarking data can be used to analyze researchers' information behaviour. However, they assert that further research ought to be conducted since the results were based on a single case study.

Handschuh, Siegfried, and Steffen Staab. 'Authoring and annotation of web pages in CREAM.' *Proceedings of the 11th International Conference on World Wide Web*, (New York, 2002), 462–73. Web. 30 May 2016.

Handschuh and Staab present CREAM, a framework for metadata creation. They suggest that the author of a web page is to be able to simultaneously create the metadata that describes the content he/she is creating. The authors explain that they have expanded the CREAM framework and combined it with Ont-O-Mat in order to respond to the proposed needs of users. Handschuh and Staab outline certain requirements that would enhance the tool, such as consistency, proper reference, maintenance, relational metadata, and efficiency. They also discuss the design and architecture of CREAM, elaborating on modes of interaction with Ont-O-Mat. According to the authors, the next step would be to integrate different tools in order to actualise the possibility creating metadata in different file formats.

Kim, Young-Min, Patrice Bellot, Elodie Faath, and Marin Dacos. 'Automatic annotation of bibliographical reference in digital humanities books, articles and blogs.' *Proceedings of the 4th ACM Workshop on Online Books, Complementary Social Media, and Crowdsourcing*, (New York, 2011), 41–8. Web. 30 May 2016.

Kim, Bellot, Faath, and Dacos discuss the issue of information extraction and processing of bibliographic references in the field of digital humanities. They focus on automatic linking and relational data, using Conditional Random Fields (CRFs) to tackle this problem. They separate their work into four steps, including bibliographical reference annotation, corpus preparation, model construction, and experimentation. They conclude that CRFs are the right approach for their purposes, asserting that the presented work is the beginning of an information extraction process from the OpenEdition platform.

Noll, Michael G., and Christoph Meinel. 'The metadata triumvirate: social annotations, anchor texts and search queries.' *Web Intelligence and Intelligent Agent Technology*, 1 (2008), 640–7. Web. 30 May 2016.

Noll and Meinel compare three types of metadata: social annotations, anchor text, and search queries. This is done by using the research data corpus CABS120k08 for investigating the amount of information the web metadata types provide and how they are related. The authors present their methodology for sampling and collecting data, and discuss their results. The elements included in the study are length, novelty, diversity, similarity, and classification. Noll

and Meinel conclude that social bookmarking helps with the ‘aboutness’ of web documents, a notion they will address in future research.

Tools:

Crowley, Dennis, and Naveen Selvadurai. *Foursquare*. n.d. Foursquare. Web. 19 May 2016. <<https://foursquare.com>>.

Foursquare is a location-based social networking application primarily developed for mobile use. The main activity consists of users ‘checking in’ to different locations and tagging either the venue or the activity. Foursquare is built as a gamified structural mechanism that is often used as a model for gamification. Every check in helps the user gain points, and certain tags or specific locations can earn the user badges. Users can become ‘mayors’ of certain locations if they check in more than any other user over a certain time span.

*Delicious. *Delicious*. n.d. Delicious Media, INC. Web. 19 May 2016. <<https://delicious.com/>>. Delicious is primarily a social bookmarking site. Users can bookmark various links, websites, or articles on the Internet and share these bookmarks with other Delicious users. Although the default setting is public sharing, users can choose to archive bookmarks privately. The tool facilitates folksonomy tagging by allowing users to tag their selected bookmarks with any desirable metadata terms. Delicious makes bookmarking and organizing resources quick and easy.

Flickr. n.d. Yahoo! Web. 20 May 2016. <<http://www.flickr.com/>>.

At the time of writing, Flickr boasts over 8 billion images and 70 million photographers or active content uploaders on their site. Flickr relies heavily on folksonomy tagging to bolster their community and induce cross-community media sharing. Users can tag their uploaded photos in order to promote sharing as well as take advantage of personal indexing capacities by tagging other’s images. Notably, institutions like the White House and NASA also maintain their own Flickr streams.

Huffman, Steve, and Alexis Ohanian. *Reddit*. 20 May 2016. Reddit, Inc. Web. 30 May 2016. <<https://www.reddit.com>>.

As a popular social news site, Reddit induces users to tag and submit content. The hierarchy of posts on the front page of the site (as well as the other pages on the site) is decided by a ranking system predicated on both date of submission and voting by other users. Reddit exemplifies social knowledge creation via folksonomy tagging in a social network environment. Notably, the news site is also open source.

*KDE group at the University of Kassel, DMIR group at the University of Würzburg, and L3S Research Center. *BibSonomy*. 10 March 2016. Web. 19 May 2016. <<http://www.bibsonomy.org>>.

BibSonomy is a social bookmarking and publication sharing system for managing literature lists. Users can store and organise resources in a public framework, as well as tag and annotate entries with descriptive, user-determined terms. All publications are stored as BibTeX files and can be exported in a variety of formats, including EndNote and HTML. This tool is useful for students and researchers who are interested in organizing their resources and in collaborating with others on similar topics of interest.

**Mendeley*. n.d. Mendeley. Web. 6 May 2016. <<http://dev.mendeley.com>>.

Mendeley is a free reference management system and an academic social network. Users can generate bibliographies, collaborate, and import resources. The program can be accessed as a desktop, iPhone, or iPad application. While the standard tool is free and provides users with 2 GB of web storage space, additional storage can be purchased. The tool also includes a PDF viewer where users can add notes and highlight text. Citations can be exported as BibTeX and transferred into several word processor formats. The social networking features include newsfeeds, comments, and profile pages. User statistics about papers, authors, and publications may also be viewed.

*Net 7. *Pundit*. 29 October 2015. Pundit LAB. Web. 22 February 2016. <<http://thepund.it/>>.

Pundit is an open source annotation tool that allows users to comment, bookmark, highlight, or tag web pages. One of its distinctive features is the option to create semantically structured data in the form of annotations that can be reused, therefore fostering collaborative and social creation and dissemination of knowledge. This functionality is carried out by adopting linked data standards that allows users to connect various sections of a text with each other, and encourages more effective web navigation. User work can be accessed through a central searchable dashboard. This tool is primarily designed for enhancing research, work, and study practices.

Oversity. *CiteULike*. 2006. Web. <<http://www.citeulike.org>>.

CiteULike is a free online social bookmarking service for scholarly research. Users can search and discover resources, receive automatic article recommendations, share references, view what others are reading, and store and search a repository of PDFs. CiteULike is structured as a folksonomy, allowing users to tag references and thus organise their libraries. In addition to adding tags, users can also comment on and rate resources. Citation information can be automatically imported from a number of popular databases, such as JSTOR and arXiv.org, and citations can also be imported or adjusted manually, or else transferred to other reference management systems such as End Note or Zotero.

Pinterest. *Pinterest*. n.d. Web. 30 May 2016. <<http://pinterest.com/>>.

Pinterest merges folksonomy tagging, inspiration boards, and a classic social network framework. A web-based application, Pinterest encourages sharing through ‘pinning’ or posting image or video collections to a user’s pinboard or page. Pins can be freely shared and circulated, multiple users can pin on the same board, and users can follow other users’ boards. Notably, boards can be public or private depending on user preferences.

*President and Fellows of Harvard College. *Highbrow*. 14 November 2011. Harvard Library Lab. Web. 30 May 2016. <<https://osc.hul.harvard.edu/liblab/projects/highbrow-textual-annotation-browser>>.

Highbrow is a textual annotation browser and visualization tool. It visualises the density of scholarly annotations and references in individual texts, and can compare multiple texts to indicate patterns or highlight areas of interest for scholars. Users can view the visualizations at a higher level of quality that indicates density, or else zoom in for more detailed information. Highbrow functions for textual annotations as well as video and audio annotations.

Qiqqa. n.d. Quantisle. Web. 22 February 2016. <<http://www.qiqqa.com/>>.

Qiqqa is a downloadable application that helps with the organization of PDF documents. Users create libraries where they can preview documents before opening them. It has a 'Vanilla references' feature that allows users to attach documents to their metadata once they have them. Qiqqa automatically detects duplicate documents and allows importation from computer, from other applications (such as Zotero), and from the user's hard drive. It also has built-in Optical Character Recognition (OCR), supports metadata, auto-population, and BibTex. When it comes to tagging, it has a tag explorer for supertagging, which offers autotagging and hierarchical storage of tags. Qiqqa searches through texts, filters them, and, through computational linguistic algorithms, performs library analysis. Furthermore, Qiqqa has features that allow reviewing (including annotating and highlighting), collaborating, and creating documents. This tool is geared toward the work of students and researchers.

*Schneirov, Zachary. *Notational Velocity*. 31 March 2011. Web. 22 February 2016. <<http://notational.net/>>.

Notational Velocity is an open source application that stores and retrieves notes. It allows users to add, search, and edit content. For the purposes of filtering efficiency, notes are expected to be brief and specific. In addition, when a user enters a note in the Search/Title area, Notational Velocity suggests related notes. This tool was designed with no buttons, which limits it to keyboard input. In Notational Velocity, data is automatically saved and changes are immediately applied. Documents produced can be synchronised with Dropbox, Simplenote, PlainText, Elements, and iA Writer.

StumbleUpon. *StumbleUpon*. n.d. Web. 20 May 2016. <<http://www.stumbleupon.com>>.

StumbleUpon is a discovery search engine that finds and recommends content based on personal user interests. In this way, users may discover new content based on their already-asserted and tagged interests. In order to keep the system running, users are encouraged to rate content while they review it, as peer-sourcing functions determine relevant content. Through collaborative filtering and folksonomy tagging the system organises and culls user opinions. Notably, StumbleUpon also functions as a social network allowing bibliographic annotation of posts.

*University of Hamburg. *CATMA*. Version 4.2.0. Web. 10 May 2016. <<http://catma.de>>.

CATMA is a web-based text analysis and literary research application that permits scholars to work collaboratively by exchanging analytical results online. The application boasts a number of features: users can apply analytical categories and tags, search the text using Query Builder, set predefined statistical and non-statistical analytical functions, visualise text attributes and findings, and share documents, tagsets, and markup. CATMA consists of three modules: the Tagger for markup and tagging of a text, the Analyzer for queries and a variety of text analysis functions, and the Visualizer to create charts and other visualizations of analysis results. This tool is aimed at users with interest in textual analysis and literary research.

Wikindx. *WIKINDEX*. Version 4.2.2. Sourceforge. Web. 20 May 2016. <<http://wikindx.sourceforge.net>>.

WIKINDEX is a free online bibliography as well as a quotation and note management system. It allows for collaborative use of and contributions to bibliographic data, while also providing features for users to add notes, quotations, and articles. The tool thus functions as reference

management software and as a collaborative writing and annotation environment. WIKINDX includes search functionalities, allows for attachments to bibliographic resources, exports into most major data and citation styles, and offers customizable plugins. It is adopted by various institutions such as Logiques du Renseignement, University of British Columbia, and Objektive Hermeneutiks.

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