ZfdG

Zeitschrift für digitale Geisteswissenschaften

Fachartikel aus:
Zeitschrift für digitale Geisteswissenschaften, Heft 11 (2026)

Titel:
Modelling the Middle Ages. VisColl and VCEditor as a Digital Tool for Manuscript Research

Autor*in:
Suzette van Haaren

Kontakt: suzette.vanhaaren@ruhr-uni-bochum.de
Institution: Ruhr Universität Bochum
GND: 1265046328 ORCID: 0000-0002-1403-6894
Contribution (CRediT): Investigation | Methodology | Data curation | Writing – original draft

DOI des Beitrags:
10.17175/2026_010

Nachweis im OPAC der Herzog August Bibliothek:
1972849611

Erstveröffentlichung:
05.08.2026

Letzte Überprüfung aller Verweise:
22.06.2026

Format:
PDF ohne Paginierung, Lesefassung

GND-Verschlagwortung:
Buchwissenschaft | Einbandkunde | Handschrift | Mediävistik | Softwaresystem

Empfohlene Zitierweise:
Suzette van Haaren: Modelling the Middle Ages. VisColl and VCEditor as a Digital Tool for Manuscript Research. In: Zeitschrift für digitale Geisteswissenschaften 11 (2026). 05.08.2026. HTML / XML / PDF. DOI: 10.17175/2026_010

Suzette van Haaren

Modelling the Middle Ages. VisColl and VCEditor as a Digital Tool for Manuscript Research

Abstract

VCEditor (VisColl Editor) is a digital tool for modelling, visualising, and reconstructing the collation structure of books. This article discusses how tools like VCEditor shape research practices of medieval manuscript scholars. Based on in-depth interviews with the developers and with users, this article details how scholars use VCEditor in their work and, as a consequence, the possible implications for the way manuscript scholarship is conducted. This is taken as starting point for a theoretical consideration in which digitisation and its effects on scholarly material engagement and knowledge production is examined. The findings demonstrate how VCEditor operates not merely as a technical aid, but as a mediating contributor to knowledge production – one whose epistemic significance emerges at the point of interactive engagement between scholar, software, and medieval material.

VCEditor (VisColl Editor) ist ein digitales Tool zur Modellierung, Visualisierung und Rekonstruktion der Lagenstruktur von Büchern. Dieser Beitrag untersucht, wie Tools wie VCEditor die Forschungspraxis in der mediävistischen Handschriftenforschung formen. Auf der Grundlage ausführlicher Interviews mit Entwickler*innen und Nutzer*innen wird dargestellt, wie Forschende VCEditor in ihrer Arbeit einsetzen und welche Folgen sich daraus für die Art und Weise ergeben, wie Handschriftenforschung betrieben wird. Dies dient als Ausgangspunkt für eine theoretische Reflexion über die Digitalisierung und ihre Auswirkungen auf die materielle Forschungspraxis und Wissensproduktion. Die Ergebnisse zeigen, dass VCEditor nicht nur als technisches Hilfsmittel, sondern als Vermittler zur Wissensproduktion fungiert – einer, dessen epistemische Bedeutung sich im Moment des interaktiven Zusammenspiels zwischen Forscher*in, Software und mittelalterlichem Material entfaltet.

1. Introduction

VisColl (Collation Visualization) is a data model developed and maintained at the Schoenberg Institute for Manuscript Studies (SIMS) at the Penn Libraries, University of Pennsylvania. Created by Dot Porter and Alberto Campagnolo (et al.[1]), it is used to describe and visualise the quire and binding structure of manuscripts in multiple different digital formats. The data model is implemented in the online software environment VCEditor (VisColl Editor) which processes the information about a book's collation in a collation model and visualises it in a diagram.[2] The generated collation models serve as digital documentation and, at the same time, as research objects that aid the analysis of historical book material. [1]

Understanding the structure and binding of a manuscript can reveal a lot of information about its contents and its history. The *codex* is the most common book form of the Middle Ages and one that we automatically associate with what a whole book looks like. Codices are bound books, consisting of collections of double folded sheets, forming quires that are sewn together and fastened at the spine, usually protected by wooden covers. The way quires are collated differs greatly per manuscript and can vary from straightforward to very complex. The collation of a manuscript is a testament to its creation, use and time: different traditions of manuscript making convey different ways of collating. Moreover, manuscripts were subject to alterations, to additions, to re-assembly, and to paste-ins and cut-outs.[3] The structural aspects of the material medieval book, however, are challenging to convey in their digitisation. [2]

[1] Project collaborators are Doug Emery, Lynn Ransom, Patrick Perkins, Jeff Chiu, Gregor Middell, and Conal Tuohy.
[2] A selection of published work about the VisColl project by its developers: Campagnolo / Porter 2022; Campagnolo et al. 2018; Porter 2022a; Porter 2022b; Porter 2022c; Porter et al. 2017a; Porter et al. 2017b; VisColl 2022.
[3] Cf., for example, Campagnolo 2020; Gumbert 2004; Rudy 2016.

The process of digitising a medieval manuscript involves a relative fragmentation and datafication of the book-object: photos are taken, a physical description is made, but the ›wholeness‹ and ›heft‹ of the book are difficult to convey.[4] The standard digital medieval manuscript is a collection of data in the form of a list of photographs and a description in metadata. Digitisation involves a change in materiality that points to a loss of information, particularly when considering the physical and tactile nature of the book.[5] The VisColl project describes and attempts to solve the problem of material fragmentation in digitisation, allowing the reconstruction of manuscript structure in digital form. This has introduced a new kind of research material into medievalists' scholarly practice, asking them to navigate the loss of information through experimenting with different representations of and possibilities for their objects of study.[6] This suggests a potential shift in epistemology that asks for closer investigation. [3]

This article explores VisColl as implemented in VCEditor as a digital tool for the study of codex manuscripts. Although the tool is applicable for broader use, I specifically discuss the use of VisColl for the study of medieval manuscripts and within the context of digital codicology.[7] The focus of this article is on how VCEditor is used to translate medieval material into digital models, visualisations and metadata, and how this supports and shapes daily research practices. The VisColl project is taken as an example to discuss a perceived paradigm shift in manuscript research through the increasing use of digital tools. In this article, VCEditor embodies a larger trend in the digital humanities that sees digital tools meant for discipline-specific purposes yet flexible enough to support open-ended use and personalised scholarship, rather than being developed specifically to suit a single research or digitisation project.[8] [4]

Based on seven in-depth interviews with users, this article details how scholars use the digital tool in their work and the possible implications for the way manuscript scholarship is conducted. I am particularly interested in how VisColl is used in small (often individual) scientific settings and how the tool allows for the creation of ›personalised‹ virtual research objects. I situate this in relation to non-digital methods – particularly sketching – to explore material engagement and the role of tools in scholarly thinking. From there, I turn to VCEditor's position in personalised (as opposed to institutionalised) digitisation processes, which is examined through scholars' accounts of using VCEditor to deconstruct and reconstruct their medieval research objects, and the ability for speculation within the modelling process. This raises broader questions about the everyday use of digital tools, data structuring, knowledge production, the possibilities and restrictions of digital environments, and the extent of innovation in the field. [5]

2. Method

The analysis in this article consists of a sociological and a theoretical component. The uses of digital technologies for manuscript research are established in simple everyday practices, and their effects trickle down to catalogue entries and research outcomes and, finally, to how we understand the Middle Ages. This study, then, begins by observing how people use VCEditor in their engagement with medieval material. To encapsulate the underlying theory, I use the term *virtuality* to describe the process of knowledge production in the context of digital tools and medieval studies. [6]

[4] On the ›heft‹ of manuscripts and how this is conveyed in digitisation, cf. Treharne 2021.
[5] Recent literature on manuscript digitisation also includes Treharne 2021; Porter 2022a; Warren 2022; Whearty 2022; van Haaren 2025b.
[6] I use the word ›scholarship‹ and ›scholar‹ in the broadest sense of the word: including manuscript scholars, medievalists, early modernists, librarians, archivists, conservators, students or hobbyists, whether or not they are affiliated with an academic institution.
[7] Cf. Whearty 2022; van Haaren 2025b.
[8] Other examples are Transkribus, eScriptorium, Recogito, Nodegoat, and Voyant Tools.

Stepping beyond the digital, I explicitly use the term virtuality to refer to the merging of digitality, imagination and knowledge production.[9] History writing is an ongoing process of interpretation, shaped by the interplay between historical material, human imagination, and, increasingly, digital technologies. The technologies used by historians actively structure research and (daily) research practices. And as historical research moves further into the digital realm, the questions we ask, the patterns we see, and the histories we write are inevitably shaped by the technologies we use.[10] By structuring historical data into digital objects and models, the interaction between computer and scholar facilitates our understanding of the past. [7]

Of course, historiographical in-betweens are nothing new: think for example of editions, photographs or microfilm. Mediations – and, as this article will also discuss, analogue methods like sketching and note-taking – have long shaped the way we access, analyse, and interpret historical material. These processes, now highlighted by the prominence and importance of digital tools, construct virtual spaces and objects that shape the way we perceive and engage with historical sources. As a result, our perception of medieval material is in constant flux, shaped and reshaped by the evolving relationship between digital tools and historical inquiry. [8]

To investigate the impact of digital technologies on everyday research practices and how this facilitates the creation of virtual objects in medievalist research, I approach VCEditor from a sociological and ethnographical standpoint.[11] This research was conducted during my time as research fellow at SIMS in April 2024. I conducted interviews with the developers (Porter, Campagnolo and Doug Emery, digital content programmer at the UPenn Library) and with users. By engaging hands-on with VCEditor to build collation models, I developed user-perspective insights into its possibilities and constraints, informing an auto-ethnographic reflection on my interaction with the tool.[12] [9]

A central component of this study is a series of semi-structured, episodic narrative interviews conducted with seven scholars working at different career stages.[13] These scholars, based in the United States (3), Germany (2), and the Netherlands (2), were selected to provide insight into a range of research experiences and perspectives. The participants work in academic institutions, libraries, museums, conservation or restoration studios.[14] All interviews were conducted over Zoom. The interviews were designed to elicit narrative-driven accounts of participants' research practices, enabling them to position themselves within their research landscape, offering insights into both the conceptual and practical dimensions of their engagement with VCEditor. By asking participants to share their online workspaces through screensharing – VCEditor interface, collation models, and ongoing projects – I was able to observe firsthand how they navigated the tool and structured their digital manuscripts. [10]

The goal of the interviews was not only to document how scholars use VCEditor but also to understand the impact of digital tools on the ways they conceptualise, structure, and interpret their research objects. The interviews were coded to analyse a few overarching themes, and overall observations and quotes from the interviews are used to reflect these themes in this article.[15] The conversations allowed me to not only examine how scholars use VCEditor but also critically analyse the tool itself, with a focus on the software design, [11]

[9] When using the term virtuality, I explicitly do not refer to virtual reality (VR) technology. The ideas presented in this article stem from a recent reconsideration of the term ›virtual‹ in light of the increasing digitisation of daily life. Cf., for example, Rieger et al. (eds.) 2020.
[10] Cf. e.g. Fafinski 2022.
[11] Cf. e.g. Barad 2007; Haraway 1988; Latour / Woolgar 1979.
[12] Cf. Ellis / Adams 2014; Stigter 2016.
[13] Cf. Aburn et al. 2021; Mueller 2019.
[14] The interviews were 1 to 1.5 hours long and conducted in English or Dutch. The conversations were conducted based on participant anonymity. However, I recognise that manuscript studies is a relatively small and specialised field, and the discussion of specific research practices may, to some extent, reveal participants' identities. While I acknowledge this limitation, I refrain from making any explicit statements about who was interviewed.
[15] The quotes used throughout the text are cleaned up to be more readable. Translations from Dutch to English are provided by the author. For full interview transcriptions, contact the author.

structure and functionality. By focusing on the ways in which the software mediates scholarly engagement with manuscripts, this paper explores how technological (design) choices influence research workflows, interpretative frameworks, and the production of knowledge. This method allowed me to combine insights from (digital) medieval studies with science and technology studies (STS): how is our understanding of medieval books shaped through digital and virtual research objects?

3. The VisColl Data Model and VCEditor

[12] The VisColl project was initiated in 2013 and has been running continuously under leadership of Porter and Campagnolo, who devote their time to the upkeep and eventual further development of the tool.[16] The digital tool addresses the problem of digitally conveying manuscript collation in a straightforward and dynamic way, without relying on traditional collation formulas. Collation formulas describe the structure of a manuscript by noting each quire in terms of the position of that quire in the manuscript, how many leaves each quire contains, and if any leaves have been added or removed.[17] Formula notation is notably abstract and complicated, often wanting information and it is not standardised across manuscript scholarship. The developers indicate that the description of collation in formulas is especially frustrating when dealing with complex manuscripts, which both Porter and Campagnolo encounter often in their work.[18]

[13] The VisColl Data Model defines the structure of book collation and models the gathering structure based on input data by the user. The data model is implemented in VCEditor, the online software environment in which users can input and export data in an accessible interface. VisColl 2.0 (launched in 2019) specifies rules for how quires are structured, how they relate to one another, and allows for the addition of information like whether leaves are original, added, missing or replaced, specific attachment methods, defining hair or flesh side of the parchment, and contents and illumination. The output created by the VisColl Data Model is referred to as a collation model. The XML formatted collation model allows processing in multiple ways, most notably in diagrams and collation formulas. VCEditor was developed to simplify the input and output of data, and the visualisation of the created models.[19] The software environment, launched in 2022, implements the VisColl model into a user-friendly editor, making the workflow more accessible for a broader group of users.[20]

[14] VCEditor's presentation borrows from diagrams known throughout book scholarship: published scholarly works include detailed collation visualisations in the form of diagrams, for example with interlocking U- or V-shapes or blocks connected by lines depicting folia and quires (cf. Figs. 1 and 2).[21] These types of diagrams are also used in digitisation projects, e.g.: *Petrarchive* created at the Indiana University in Bloomington, a digital edition of Petrarch's songbook; the *Welscher Gast digital* created at Heidelberg University, a digital edition of the known manuscript tradition of the *Welscher Gast* (cf. Fig. 3); *Impos[i]tor*, a tool for arranging digital images from the Folger Shakespeare Library in Washington D.C. into simulated printing sheets.[22]

---

[16] The project is in part funded by the University of Pennsylvania Libraries, and in part reliant on separate grants. In August 2024 the project was awarded a three-year development grant from the National Endowment for the Humanities Digital Humanities Advancement Grants programme, which was terminated by the US government in April 2025. Cf. VisColl 2022.

[17] Two ways of noting the collation formulas for Kislak Center, LJS 216 (the manuscript example also shown in Figs. 4 and 5) are, for example: 1(8, -2), 2(12), 3(8, -1, -2), 4(8, -6), 5(8, -1), 6(6), 7(8), 8(6, -6); or alternatively: 1(8, leaf missing after fol. 1), 2(12), 3(8, first leaf is missing), 4(8, leaf missing after fol. 30), 5(8, first leaf is missing), 6(6), 7(8), 8(6, leaf missing after fol. 57)).

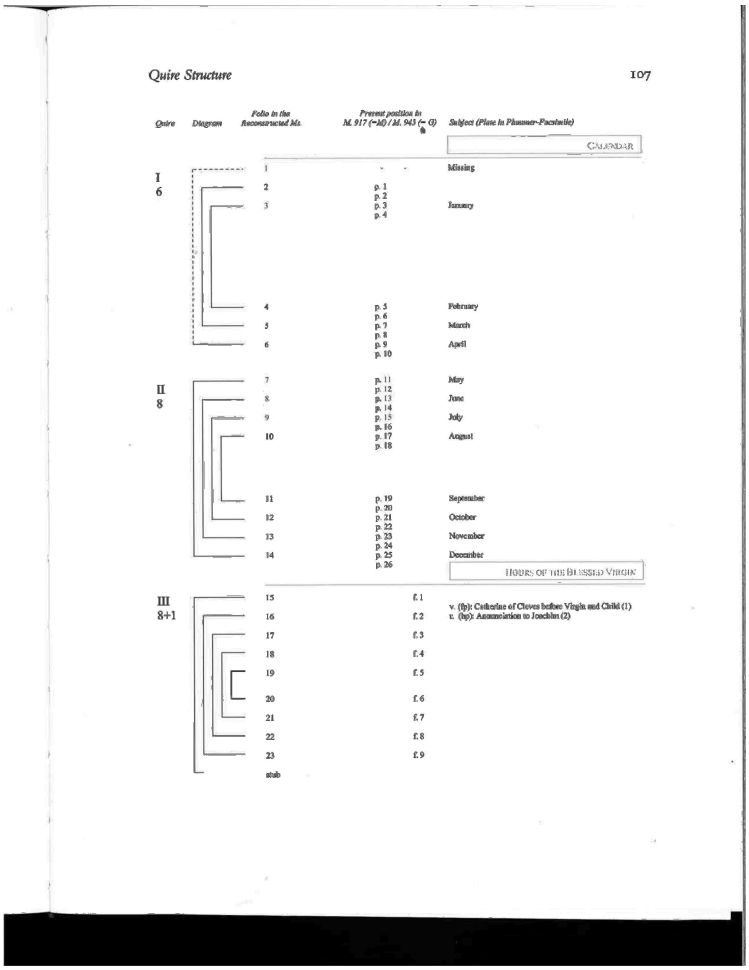
[18] Interview with the developers, 15 April 2024, time stamp 00:05:25–00:09:23.

[19] Before this, the VisColl Data Model was implemented in the ›Collation Modeler‹, where the user would provide structural information as input. The data model provided XML output that could be put in the ›Collation Visualizer‹, processing the collation model (and an image list) to produce four distinct views: 1) a one-page-per-quire HTML view, 2) a whole manuscript page, 3) a diagrams-only view, and 4) a collation formula. The XML output was flexible, but the process of creating it required a relatively high amount of computing skills. The VCEditor software is based on the now obsolete VisCodex, a project that used the VisColl Data Model to create a user interface created at the University of Toronto. Cf. VisColl 2022.

[20] It should be kept in mind that the user base of the tool is a relatively small group of people: VCEditor has 1288 confirmed accounts, 308 of which were created in the last year (since May 2024). The tool was signed into by 366 separate accounts since May 2024 (email conversation between Dot Porter and the author, 05.05.2025).

[21] These examples can be found in respectively Dorofeeva 2019, p. 347; Dückers / Priem 2009.

[22] Magni et al. (eds.) 2013–2023; Šimek et al. (eds.) 2015; Folger Shakespeare Library 2011. Cf. also Campagnolo 2015.



Quire Structure 107

Quire	Diagram	Folio in the Reconstructed Ms.	Present position in M. 917 (=M) / M. 945 (= G)	Subject (Plate in Plummer-Facsimile)
				CALENDAR
I 6		1	- -	Missing
		2	p. 1 p. 2	
		3	p. 3 p. 4	January
		4	p. 5 p. 6	February
		5	p. 7 p. 8	March
		6	p. 9 p. 10	April
II 8		7	p. 11 p. 12	May
		8	p. 13 p. 14	June
		9	p. 15 p. 16	July
		10	p. 17 p. 18	August
		11	p. 19 p. 20	September
		12	p. 21 p. 22	October
		13	p. 23 p. 24	November
		14	p. 25 p. 26	December
				HOURS OF THE BLESSED VIRGIN
III 8+1		15	f. 1	
		16	f. 2	v. (fp): Catherine of Cleves before Virgin and Child (1) v. (bp): Annunciation to Joachim (2)
		17	f. 3	
		18	f. 4	
		19	f. 5	
		20	f. 6	
		21	f. 7	
		22	f. 8	
		23	f. 9	
		stub		

Figure 1: Visualisation of the collation of the Hours of Catherine of Cleves, Morgan Library, M. 917 and M. 945. [From: Dückers / Priem 2009, p. 107]

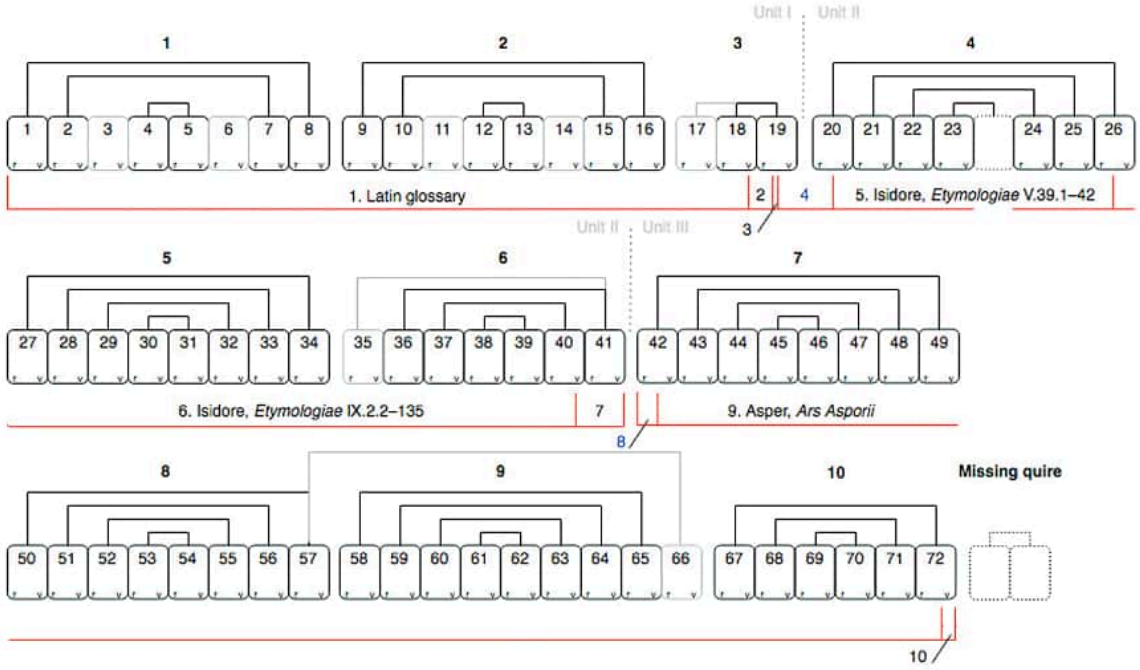


Figure 2: Visualisation of the collation of Bern, Burgerbibliothek, ms. Lat. 611 (made in draw.io). [From: Dorofeeva 2019, p. 347]

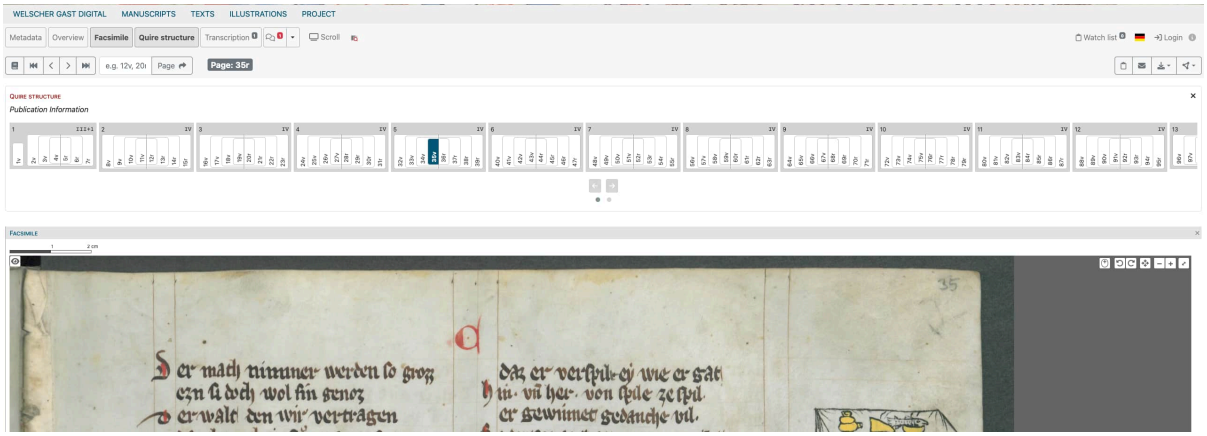


Figure 3: Visualisation of the collation of Gotha, Forschungsbibliothek, Cod. Memb. I 120 in the *Welscher Gast digital*. [From: Šimek et al. (eds.) 2015]

Even though the developers of VisColl were by no means the first who dealt with the collation problem in a digital environment, the project's focus on open accessibility and generalised use, as opposed to creating collation diagrams that are in the service of a specific project as described above, makes the editing tool unique in the field. The current software implementation (VCEditor version 1.0) allows for the creation of an overview of the structure of a manuscript presented in a visual diagram, and for the additional mapping of features and images ›on top of‹ the collation model. Users no longer work with the XML format but instead work directly in the visualised diagram, through which data is structured and organised. The creation of a new project begins with the import or manual entry of data points. Typically, users choose to ›prepopulate with quires‹ to fill in known information about a manuscript's structure, and more detailed information about conjoining, folio or page numbering, parchment texture and notation style. This generates the collation diagram. VCEditor's diagrams visually map the folded sheets of each quire in a nested U-pattern or in tabular [15]

mode (cf. Figs. 4 and 5). Each quire and leaf is numbered and labelled (e.g., ›Quire 1‹, leaf position: ›L1‹, recto or verso: ›1r‹, ›1v‹), and can be adjusted to match the material situation of the book: the folio between 30 and 31 in Fig. 4, for example, is tagged as ›missing‹ – hence the dotted line.

Figure 4: U-shaped visualisation of the collation of Kislak Center, LJS 216 in VCEditor. [Screenshot and collation model: Suzette van Haaren 2026]

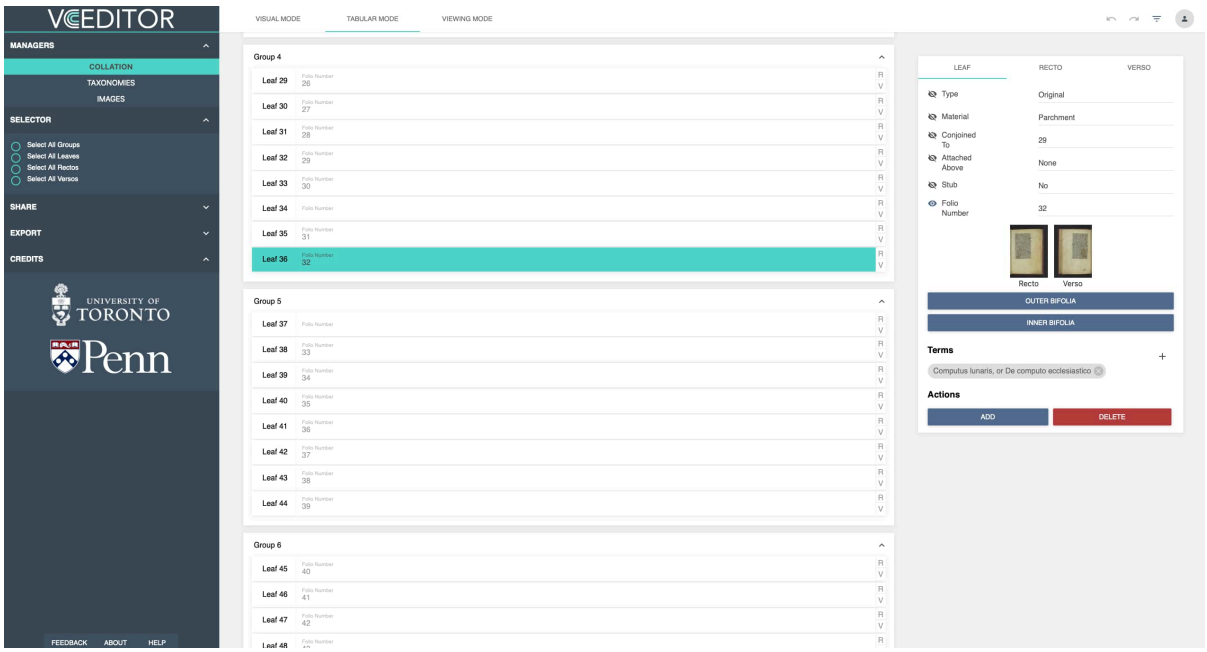


Figure 5: Tabular visualisation of the collation of Kislak Center, LJS 216 in VCEditor. [Screenshot and collation model: Suzette van Haaren 2026]

Once the information is put in, users edit the model by interacting with the visualisation. Implementing the integration of more detailed information about, for example, gathering structure and sewing practices was important to the developers. Alberto Campagnolo explicitly states that he wanted to allow the tool to [16]

»do things that conservators would be interested in«, like sewing and tackets.[23] Taxonomies allow users to clump together terms, which allow for the mapping of additional information like the positions of texts or miniatures. These are optionally shown above or below the lines that indicate leaves or quires. Images can be linked through their *IIIF* manifest or by uploading them directly to the software environment. This attaches the photos to the relevant leaves in the collation diagram, making them part of the interactive whole: clicking on a leaf presents the user with images of its recto and verso, and it presents the option to view the outer and inner folia of a bifolium. The data can be exported in various formats (JSON, XML, SVG, PNG, HTML, collation formulas) and the diagrams can be shared in an interactive viewing mode with a link to the software environment.

Although the interviewees navigated through the programme in varying ways, it can generally be said that the use of software came quite naturally – a variable dependent on personal skills with software navigation in general.[24] While the general workflow was similar, each interviewee created and interacted with their models in different ways – from one another, but also sometimes in the scope of their own work. Although the workflow in the VCEditor environment is in many ways standardised, the reason people generally chose to use it was because of the opportunity for personalisation the software offers. Rather than presenting the user with collation diagrams that are developed for and tailored to a specific project or manuscript digitisation in an institutionalised context, VCEditor provides a personal workspace that allows users to enter and organise information about their historical material research objects in a way that suits their goals: documentation, organisation, visualisation, investigation, experimentation and / or analysis.[25] [17]

In being ›toured‹ around each interviewee's VCEditor workspace, I observed great variation among the collation models: ranging from long to short project lists; from simple collation statements to very detailed material descriptions; from a strong focus on images to no inclusion of images; from applying IIIF to uploading one's own images; from detailed taxonomies describing materiality and contents to no attached terms at all. In contrast to most users who use taxonomies sparingly, if at all, user 5, for example, reveals a detailed taxonomy system that describes material specifications and particularities, texts, the chronology of contents, different scribal hands, and miniatures.[26] Used by most users is the option to map and link digital images. User 2, an art historian, states that they consider the images their main data.[27] The information input and manipulation are in the hands of the user; the created collation models show varying details and degrees of granularity, and betray the scholar's background, interests and research goals. The created collation models are uniquely personal research objects: not just digitisations of manuscripts but representations of the specific needs of a specific user – even if that user is working in the context of an institutional effort to digitise. This highlights the embeddedness of digital technologies in daily research practices and is situated on the edge of institutional knowledge production. [18]

I have identified roughly three types of collation models that are created and used by VCEditor's users: (1) documenting models that record what is there, (2) recreating models, interested in digitally recombining existing fragments, and (3) experimental or speculative models that wonder about what may have been [19]

[23] Alberto Campagnolo, interview with the developers, 15 April 2024, time stamp 00:11:21–00:12:46.

[24] User 3 describes their students work: »how exactly they represent the leaves or the connections between the leaves, how the sewing looks, how they represent the page numbers, that is left up to them. I think there's not a huge amount of variety in how you can do this. There is a right way to use VCEditor and a wrong way. Sometimes I have to explain to them [that] this program allows you to do certain things that you might not necessarily think that it can do.« Interview with user 3, 22 April 2024, time stamp 00:32:03–00:33:10. Cf. also Rietveld / Kiverstein 2014.

[25] Other ways of digitally creating collation diagrams mentioned during the interviews were in Microsoft Word, Microsoft Excel, Microsoft PowerPoint or Apple Keynote. This was generally considered a lesser or previously used alternative to VCEditor. Although mostly described as a laborious process with not-ideal output, the importance of creating a visualisation in digital form was stressed.

[26] Interview with user 5, 26 April 2024, time stamp 00:29:34–00:34:42.

[27] Interview with user 2, 19 April 2024, time stamp 00:12:49.

or what could have been based on extant material (or on imagination).[28] The produced visualisations are used as additional metadata in digital collections, in scholarly research, for teaching and for conservation documentation. In most cases, however, the collation models were seen as a space for active process and analysis, rather than using the tool for producing static output. The three types of collation models (with potential overlap) form the starting point for my discussion of how the users interact with VCEditor in their daily lives and the way they create their own digital research object, and the role the software plays in shaping and virtualising the digital medieval material.

4. Sketching as Digital Metaphor

[20] The use of VCEditor is a material practice that is specific to its digital environment, yet it echoes analogue note-taking methods in many ways. User 5 describes the software explicitly as a »sketching instrument«.[29] Drawing a comparison between analogue methods to digital ones, VCEditor sheds light on the process of sketching and modelling as cognitive and interpretative tools in scholarly research practices. The practice of sketching, putting pencil to paper and drawing out the structure of a manuscript to help visualise its collation, is a material and physical act that is significant to many manuscript scholars. Several interviewees explained that the act of personal sketching out collation statements with pencil (or pen) and paper was or still is part of their research practice.

[28] Examples are Jana Schillinger's documentation of Cologne cod. 83-II (Schillinger 2022); the codicological documentation of the Richthofen Kolleksje (Popkema et al. 2023); Lisa Fagin Davis's reconstruction of the Beauvais Missal (Fagin Davis 2016, pp. 147–150; Fagin Davis 2019a; Fagin Davis 2019b) and my own experimental speculative model of Kislak Center, LJS 479 (Moral and medical miscellany, speculative).

[29] Interview with user 5, 26 April 2024, time stamp 00:10:46.

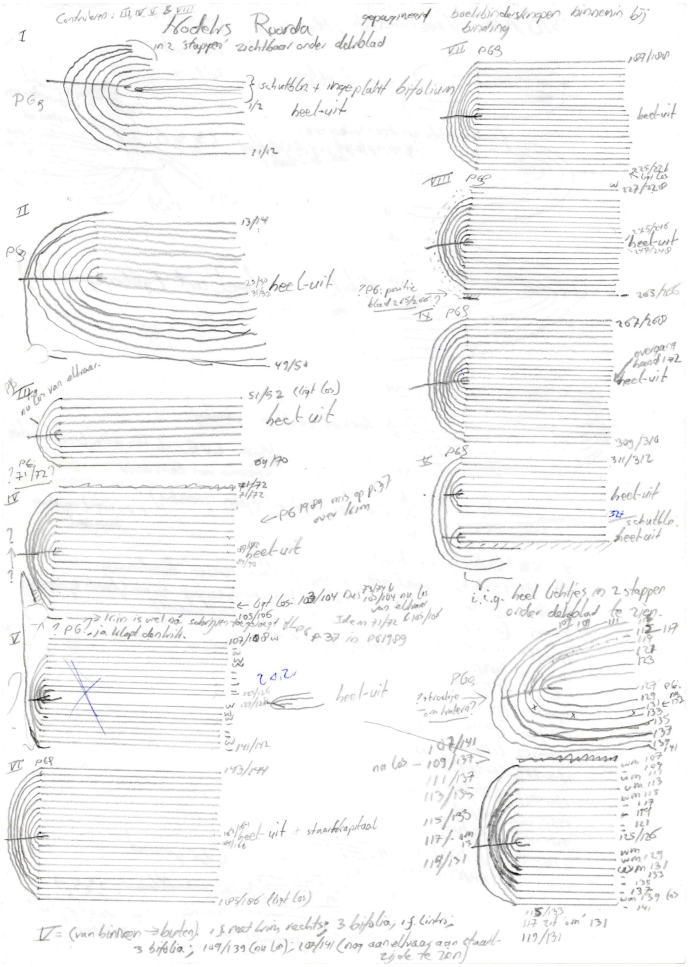


Figure 6: Sketches of the collation of Codex Roorda, Tresoar, ms. R 6 in the Richthofen Kolleksje. [Sketches and scan: Herre de Vries 2026]

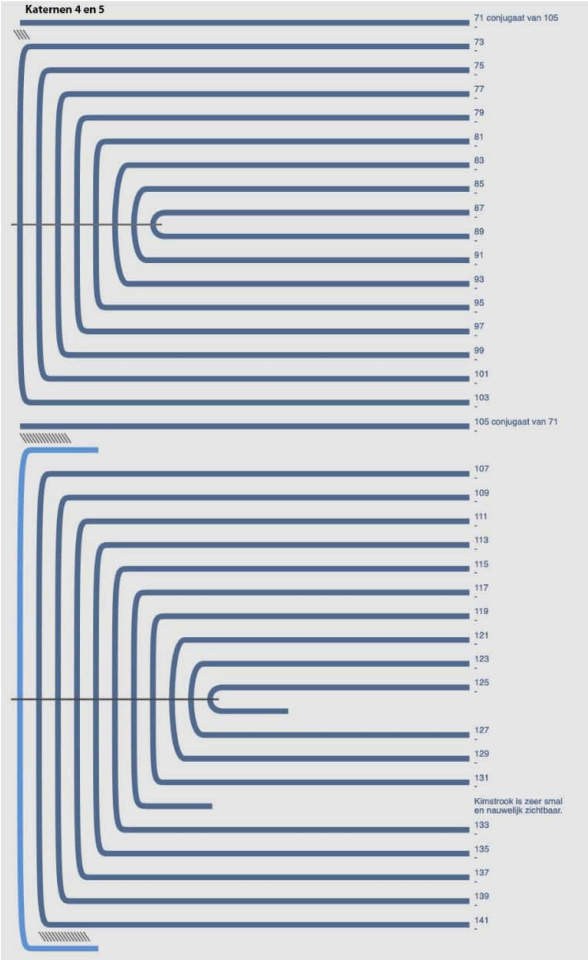


Figure 7: Visualisation of the collation of quire 4 and 5 in Codex Roorda, Tresoar, ms. R 6 in the Richthofen Kolleksje. [From: Popkema et al. 2023, p. 100; collation model: Herre de Vries]

The sketches in Fig. 6 show their rough and ready nature. These personal notes were sent to me by Herre de Vries at research group Pastei working on the manuscripts in the Richthofen Kolleksje kept at Tresoar in Leeuwarden. Fig. 6 shows sketches of the collation of the Codex Roorda (ms. R 6). De Vries's sketches form the basis for the VCEditor models that are published in the official documentation of the manuscript collection (cf. Fig. 7). These ›documenting‹ models are straightforward and give little information other than the quire structure of the manuscript. In fact, they only show deviations in diagram form and not the full manuscript collation.[30] The sketches in Fig. 6 show a different approach: mistakes are made, crossed out, notes refer to leaves and quires, question marks indicate insecurities, arrows link one information point to another. In the final published output, much of this detail is not conveyed through the VCEditor diagrams: most of the more complicated detail is conveyed in the codicological description. The sketched diagrams, then, have the purpose of creating an overview for the researcher, providing a space for analysis. Notes and question marks indicate a process of trial and error. The VCEditor screenshots provide an overview for the reader: neat, concrete and cleaned of the analytical process. [21]

A few interviewees indicate that the digital model outputs were used to make hand-sketched collation drawings more presentable for publication or sharing. User 2 explained that they were more confident sharing a VCEditor model to colleagues than »whatever [their] poor drawing might look like«.[31] The sleek design of the digital collation model output was pointed out as a reason to use the tool. Notable is VCEditor's [22]

[30] Cf. Popkema et al. 2023.
[31] Interview with user 2, 19 April 2024, time stamp 00:27:47.

infrastructural design that emulates, and with that also standardises, the nested U-designs that are common in the handwritten practice. User 6 points out that erasers leave annoying marks on their pencilled sketches when they make corrections, that remain visible when the sketches are scanned as output and consequently are not presentable to the outside world.[32]

[23] Whereas VCEditor mirrors analogue sketching of collation structures, the process of entering data in the software is obviously quite different to putting pencil to paper. User 6 explains that, to them, sketching by hand feels more connected to the medieval manuscript: »I think that drawing has the advantage of working on it manually. That you really go into the process. And that making it in the interface is still a bit more detached from the original object, maybe.«[33] The intimacy of the manual act of sketching, perhaps also enhanced by the fact that the practice is usually geared towards personal use to understand the object, is an experience that seems not easily translated into the digital. Digital modelling seems to evoke a feeling of distance for user 6, not least because working with VCEditor is often literally done at a distance from the original medieval book. User 7 confirms the same: they explain that they do not always have their laptop with them when they are working with their material, and thus sketching allows them to »quickly jot down a few lines. Then you can see whether [a collation] makes sense or not.«[34]

[24] Though reaching for a pencil is partly a practical consideration, these users' descriptions of sketching also call to mind an often-heard narrative of distance related to digital space, whereas manual acts are experienced as closer and more personal, perhaps even more material.[35] The touch of a mousepad seems to stand further away from the material experience than the almost natural feeling act of drawing. Factually, of course, one is not more material than the other – they are simply different experiences. However, it is clear that the increasing use of digital tools is at the expense of other research practices and experiences, which shifts what is deemed relevant and sensible in the field.[36] Using digital methods for analysing and datafying the medieval manuscript is sometimes seen as creating a kind of distance (like user 6 describes), or perhaps even an objectivity, towards the research object. This, then, should open space for new kinds of analysis.[37] Exploring whether this is a fair juxtaposition needs more room than this article allows. The experience of distance in working with VCEditor, however, is not shared by all interviewees.

[25] For user 5 the process of entering data (which they describe as »sketching« or »visualising«[38]) allows for a cognitive process similar to sketching by hand: »This is the same as when you sketch it with pencil. I like to really put it onto paper or put it on to the screen, because then your brain can start working on it. And you can connect things.«[39] They explain how they use the tool to create overview and structure in something that is sometimes perhaps difficult to see or to grasp. The logic of quire structures, for example, dictates that there should always be an even number of leaves. Structural inconsistencies or complexities are not always evident by looking at the physical manuscript, but creating a collation model brings these to the fore in a quick and easy way. User 2, similarly, explains that the process of data entry allows them to run through key points, activating a certain cognitive engagement with the material: »it's just a model to think through.«[40] Both the practice of entering the data, as well as actively manipulating the diagram is part of the thinking process.[41]

[32] Interview with user 6, 10 June 2024, time stamp 00:17:41.
[33] Interview with user 6, 10 June 2024, time stamp 00:19:17. Translated from Dutch by the author.
[34] Interview with user 7, 10 June 2024, time stamp 00:20:57. Translated from Dutch by the author.
[35] Cf. Wickberg 2020.
[36] Cf. Christoph Richter's investigation on digital design sketching practices in industrial design. Richter 2020, p. 337.
[37] On datafication and its possibilities for digital history, cf. Hiltmann 2022.
[38] Interview with user 5, 26 April 2024, time stamp 00:52:30.
[39] Interview with user 5, 26 April 2024, time stamp 00:53:31–00:54:19.
[40] Interview with user 2, 19 April 2024, time stamp 00:27:47.
[41] This is also explored in Matthew Westerby's use of VCEditor's predecessor, VisCodex (Westerby 2022).

The software environment is not a passive receptacle of data, but as Lambros Malafouris describes, an intrinsic component of thought itself: »We think with and through things, not simply about things.«[42] The tools we use to analyse, be they hard- and software or pencil and paper, shape the working practice, each bringing their own possibilities and restrictions. They are active participants in discovery and analysis.[43] The VCEditor software mediates not only the scholars' engagement with their research material but also the conditions under which that interpretation becomes possible. Its interface design steers how people move through the programme, and the way they enter and look at their data. Each question, drop down menu and toggle moves the user through a standardised format, and affords them to input certain information in certain ways. The information, then, is curated not only by the human input but also by the tool itself. [26]

Digital tools are always subject to computational structure and fixedness. VCEditor, as only one implementation of the VisColl Data Model, imposes restrictions: for example, while it allows for varying interpretations of certain structures, it does not have real room for tagging or visualising uncertainty. Users deal with this in different ways: some choose whichever interpretation of the collation they think most closely matches, whilst others work around this by creating multiple collation models (as different projects) to analyse the situation from different points of view. Other implementations, according to Dot Porter, would allow for building »a visualisation that takes [any information you want] and does whatever you need to with it.«[44] [27]

Doug Emery points to the success of VCEditor that people have not yet taken the opportunity to apply VisColl without its software implementation.[45] VCEditor, in its development as the user-friendly interface for VisColl, also plays into the demands of its users: in part because the developers respond to user questions and demand, but also because the software affords specific individual uses – even if those uses do not necessarily fit its infrastructure, like how people deal with modelling uncertainty. The software bends to people's use cases. Digital tools do not function as neutral, utilitarian devices but as dynamic, situated technologies shaped by their use; they are »practical unfoldings«.[46] The argument thus doubles over on itself: research practices are shaped by the methods and tools that are used, but their active use also consequently shapes the tool itself. [28]

The relationship between human and machine is not hierarchical from living being to robot, but dialogic: each shaping and reshaping the other. Martin Foys, in *The Remanence of Medieval Media*, expands on this point, proposing that it is part of the human condition to serve as a medium for machines: »Our world today is increasingly, overtly cybernetic in this way – as humans and machines function together in mutually formed feedback loops of information.«[47] This, Foys says, is an essential consideration for understanding the way that medieval material is remediated and interpretated. The digital environment intervenes in the practice of modelling. Thus, scholars go through their research material not only *within* but also *with* the digital medium. VCEditor shows how this interplay not only offers methods of personal scholarly engagement but also opens interpretive space for machinic imagination. Knowledge, it seems, is built in the liminal space where human intentionality and computational agency meet. And this is where the virtuality of the research objects made in VCEditor comes into play. [29]

[42] Malafouris 2020, p. 4.
[43] Cf. also Malafouris 2013.
[44] Dot Porter, interview with the developers, 15 April 2024, time stamp 00:38:56–00:40:26.
[45] The developers stress that the sustainability of VisColl lies in its underlying modelling system, and not in its software output. Doug Emery, interview with the developers, 15 April 2024, time stamp 00:40:26.
[46] Roberge / Seyfert 2016, p. 6.
[47] Foys 2017, p. 17.

5. Deconstruction / Reconstruction

Central to the use of VCEditor is its capacity to function as a method to both de- and reconstruct the book object in digital space. In a way, this echoes analogue scholarly practices again. The unbinding of medieval books is not entirely uncommon in preservation processes, and scholars (academics, librarians, conservators) often take the opportunity to study the material aspects of manuscripts more closely while the book is prepared to be rebound: a recent example is the *Très Riches Heures* (Chantilly, Bibliothèque du Musée Condé, ms. 65) that was the subject of a large research project, restoration and exposition in the summer of 2025.[48] An unbound book provides an interesting and unique view into its structure and its creation history and history of alterations. The bound book-object holds secrets in its wholeness that can only be seen in a dissection of its parts. It is not strange, then, for scholars to want to be able to unravel books more often. [30]

According to user 1, [31]

> »[t]he whole point of VisColl is that it lets you virtually disbind the manuscript. And of course, with the manuscript, nobody's going to do that. And by looking at how the scribes vary and work across the structure of the manuscript, it allows you to see things and see patterns that you could not see otherwise. So this idea of taking the manuscript apart in a virtual space is extremely valuable for seeing the manuscript in a different way that you could not see it before.«[49]

The digital collation model allows for the exploration of multiple potential realities in which the scholar can open a book, take it apart, change and re-order its insides, without the obvious material and ethical implications of these acts with the medieval book itself. VCEditor visually lays out the structure of different elements – quires, bifolia, leaves – which is then brought back together in the collation model, as one unified research object. This way, the digital tool becomes a site for negotiation between acts of dismantling and reconstitution, between fragmenting and (re)combination.

To get a real sense of a book's structure, user 1 suggests: »[…] ideally what you want to do is take the manuscript apart and scatter the bifolia and see what they look like, right?«[50] VCEditor plays into this wish: its image viewer presents a manuscript's structure not in terms of pages (like a standard digitised manuscript viewer would), but in terms of bifolia. The ›outer bifolia / inner bifolia‹ view (cf. Fig. 8) presents the images not as if the book were to lay open in front of the user – i.e. fol. 1v and 2r next to one another – , but as if the bifolium was taken out of the quire and opened – i.e. fol. 1v and fol. 8r next to one another. This functionality presents the manuscript in ways that are more difficult to achieve in a regular manuscript digitisation. Porter describes VCEditor explicitly as a space in which the medieval object can be, so much as possible, reconstructed into something that is not »flat« (like a standardised digitisation) but instead »physical«: »So what do you do when you digitise a manuscript? You take it apart. Well, here's another way to put it together […]. Let's focus on the structure […]. What I'm trying to do is remind people that books are physical objects and they're not these flat images.«[51] The ›outer bifolia / inner bifolia‹ view reminds the user that the manuscript is built in a certain way – not one page after another, but in the shape of quires, bifolia folded into one another. And yet, VCEditor remains a space where the medieval book is, like other forms of digital presentation, profoundly fragmented to fit into a materially distinct technological environment. [32]

[48] Cf. Barbe / Malo 2025.
[49] Interview with user 1, 17 April 2024, time stamp 00:13:17–00:14:24.
[50] Interview with user 1, 17 April 2024, time stamp 00:13:17.
[51] Dot Porter, interview with the developers, 15 April 2024, time stamp 00:47:52–00:49:25. On the ›wholeness‹ and materiality of books, cf. Treharne 2021.

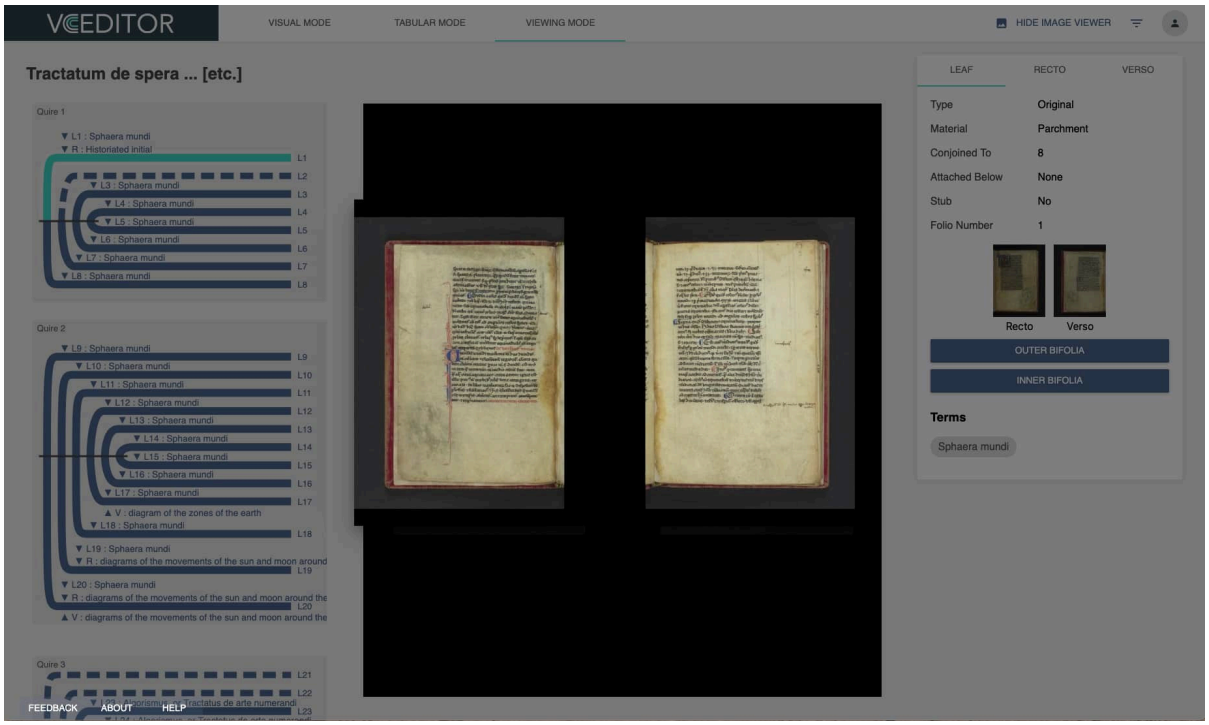


Figure 8: Visualisation of the collation of Kislak Center, LJS 216, in VCEditor, showing the ›outer bifolia‹ view of the images. [Screenshot and collation model: Suzette van Haaren 2026]

I argue that it is precisely this digital fragmentation in VCEditor, however, that allows for the exploration of alternative scenarios and to re-imagine structural possibilities. De-contextualisation is always accompanied by a process of re-contextualisation, which is where the virtuality of these digital collation models is situated. The information about the medieval manuscript passes through a level of human-machinic curation that establishes an object that is not merely digital, but that also encapsulates the material reality of its parchment counterpart in combination with the interpretation, needs, affordances and imagination inherent to scholarly practice. Fragmentation is not to be avoided but instead is necessary for the modelling process, to be able to »focus on the structure«[52] and to reconstruct. [33]

The ability to reconstruct manuscript structures and present them in a clear, coherent visual form is broadly recognised by the interviewed users as the primary strength of VCEditor. With the act of »virtually disbinding«[53] the medieval book, as user 1 describes, a new kind of reconstructed object is automatically made. The recreative process of visualising manuscript collation clarifies structural relationships within the material, making connections more apparent. User 3 likens working with VCEditor to finishing a »jigsaw puzzle«[54] for the purposes of teaching. Their students, who are learning about manuscript structure through using VCEditor, enjoy the interactivity of the act of modelling in the software. It feels like a puzzle game to them and simultaneously allows them to think about how things fit together in new ways. The structure of the book is unravelled in different data points, and the software allows them to put it back together in a coherent way. [34]

This is perhaps clearest in the collation models that reconstruct now-fragmented books (›recreating‹ or ›reconstructing‹ models). These models may involve the bringing together of manuscript fragments that are disbound, fragments that are in the same library or in different libraries. A well-known example is Fagin [35]

[52] Dot Porter, interview with the developers, 15 April 2024, time stamp 00:47:52–00:49:25.
[53] Interview with user 1, 17 April 2024, time stamp 00:13:17.
[54] Interview with user 3, 22 April 2024, time stamp 00:48:49.

Davis's work with the Beauvais Missal, a late thirteenth century missal that was cut up in the mid-twentieth century to be sold all across the world.[55] Her *Reconstructing the Beauvais Missal* project brings together a IIIF-compliant list of the known and photographed leaves of the manuscript, as well as extensive metadata and a collation reconstruction in VCEditor.[56] By synthesizing data from its surviving fragments, the original structure of a part of the dismembered book is recreated, and VCEditor provides a way to visualise what is known about the Missal's left-overs. Newly discovered leaves and other changes are dynamically implemented. Fagin Davis's collation model is an object in which the structural physicality of the now fragmented book becomes more important than the sum of its images. It makes a whole – as far as that is possible or probable – of something that is fundamentally and irreversibly taken apart.

[36] The interviewed users discuss VCEditor as a tool that opens possibilities for multiple configurations, allowing them to experiment with different hypotheses about how the manuscript is structured and, perhaps, how it was once arranged and how it might have functioned. Both user 1 and user 2 describe a similar working process with fragmented books, using terms like reconstruction, rebuilding, re-sequencing and re-visualising for their modelling practices. User 1, who combines their work in VCEditor with Fragmentarium (a »Laboratory for Medieval Manuscript Fragments«), also speaks about »building them in virtual space«[57]. User 2 explains that they create multiple differing collation models of a single manuscript: »And what I like about [VCEditor] is the chance to entertain a lot of models and scenarios for reconstruction [...] it lets me experiment and try it quickly rather than getting into the extreme details really fast.«[58] They show that their workspace consists of multiple possible collation models for single manuscripts, allowing for the exploration of different reconstructive possibilities. User 2 explains that this helps them in their analysis because they may be unsure of a certain situation, or because they want to analyse a hypothetical historical reconstruction, or for testing other scholars' collation formulas. This is also where the user runs into VCEditor's limitations when it comes to uncertainty in single models, which user 2 bypasses by their multi-model working practices.

[37] Digitisation, according to Foys, transforms the medieval manuscript into a different kind of object that is »its own source, kinetic, mutable in appearance, and a new, visual substrate for layers of information to be mapped over and around its representational surface«: a »new media object of layered, thick data«[59] that is radically manipulable and changeable. Changeability is, of course, not unique to the digital object: medieval manuscripts are mutable in themselves – as the often complex and cobbled-together structure of many books exemplifies. Yet, the fundamental fragmentation of the digitisation process (and VCEditor's ability to unravel a book's structure) reconstructs the medieval material into a different kind of source. This, what Foys identifies as mutability, continuously brings the digitised medieval material into new contexts: shifting not only where it is seen and studied, but also its own shape, appearance and materiality.[60] And where institutional digitisation presents the material in a standardised way (which Porter calls »flat«), VCEditor opens up a working space for more open-ended and variable experimentation in which research objects are suited to the user's own purpose – rather than an institution's objectives.

[55] Fagin Davis 2016, pp. 147–150.
[56] In Fagin Davis 2016, the previous version of the VisColl visualisation tool was used. On the current website of the project hosted on *Fragmentarium*, VCEditor is implemented (Fagin Davis 2019a; cf. Fagin Davis 2019b).
[57] Interview with user 1, 17 April 2024, time stamp 00:13:17–00:14:24.
[58] Interview with user 2, 19 April 2024, time stamp 00:04:30.
[59] Foys 2017, p. 20.
[60] Cf. Foys 2017, p. 24.

6. Speculative Codicology

The experimentation that VCEditor allows seems to be the apex of a progression of virtualisation. The digital tool is not just used for interpreting or reconstructing, but also for imagining entirely new or uncertain manuscript configurations. User 2 calls this a »theoretical reconstruction of broken books«[61], in which they, as already discussed, entertain potential and experimental structures. For them it is a process of »then getting closer to what is the most accurate representation of that manuscript.«[62] [38]

VCEditor supports imaginative reconstructions of manuscripts, embracing uncertainty and enabling speculative scholarly inquiry: the software structurally holds space for the hypothetical, the theoretical and the experimental. The speculative collation model is in this sense perhaps the ultimate virtual research object, in where the interactive engagement between scholarly and technological imagination holds space for potential epistemic transformation. By creating speculative models, the scholar engages in informed conjecture, piecing together a possible historical collation for the manuscript beyond what can be proven or creates a digital manuscript model of an entirely fictional book-object. That is to say, with these models the scholar speculates about what the quire structure could have been (or never was) rather than how it currently is. [39]

Imagination and speculation are important aspects of historical research. The narratives that scholars weave by investigating their historical source material are entangled with imagination and with speculation – and these are the histories we tell one another. Imagination is central to scholarly practice and the creation of knowledge, even though this remains underexposed in the light of the pursuit of objectivity and scientific truth.[63] And this is of course not only human imagination: I would argue that the technologies used by historians actively structure what is imaginable, and what is not. Multiple different fields of study (philosophy, sociology, literature) have embraced the speculative as a starting point of legitimate knowledge production. In these, the speculative functions as a mode of inquiry that challenges empirical limits, enabling the exploration of possibilities, concepts, and futures that reshape our understanding of reality. In a world of complex ontological structures, it allows the scholar to imagine other futures and other histories.[64] [40]

Speculation in the study of medieval manuscripts and medieval texts is not new. Foundational for traditional philology is Karl Lachmann's method of textual criticism, which uses the systematic comparison of extant manuscript witnesses to reconstruct a hypothetical common ancestor (the ›archetype‹) through the identification of shared errors, arranging the witnesses into a genealogical family tree and correcting remaining corruptions through conjecture, thereby producing a critical edition that approximates an ›original‹ text.[65] Through informed speculation, it strives to reconstruct a manuscript or text that has been lost as objectively as possible based on the authority of an orderly procedure.[66] Kurt Weitzmann, establishing a similar genealogical method for the study of the transmission of miniatures, was criticised for focusing too much on the hypothetical archetype, which he called the purest iconographical representation of a specific image.[67] There is an appeal for seeking and exploring manuscripts that are lost but known, through fragments (like Fagin Davis's work) or possible other sources. Codicological reconstructions and explorations are often inherently speculative, in that sense, especially when talking about the reconstruction of a manuscript [41]

[61] Interview with user 2, 19 April 2024, time stamp 00:03:26–00:04:30.
[62] Interview with user 2, 19 April 2024, time stamp 00:27:26.
[63] Cf. Staley 2020. An interesting article that has been influential to my work about the importance of imagination in the creation of knowledge is Ingold 2013.
[64] Cf. e.g. Watts 2018.
[65] Cf. Grier 1988; Maas 1958; Scherer 1883.
[66] Cf. Kleinfelder 2026 and the project ›Virtuelle Texte‹ at the SFB 1567 ›Virtuelle Lebenswelten‹ (project area B ›Wissen‹) at the Ruhr University Bochum lead by Christina Lechtermann, which looks at how the Lachmannian method feeds into ideas about emendation and the virtuality of medieval texts.
[67] Cf. Dolezal 1998.

structure that only survives in some codicological units or possibly just fragments. The reconstructive work in VCEditor that user 1 and user 2 describe is a good example of this – and perhaps also shows the slightly arbitrary nature of the division between ›reconstructing‹ models and ›speculative‹ models.

[42] The speculative codicology I discuss here presents an embrace of uncertainty, imaginative reconstruction and fiction as valid methodologies to investigate medieval manuscripts. It does not claim objectivity nor authority in the way Lachmannian philology does, instead leaving room for subjectivity and fictional experimentation. I see this way of interpreting and working with historical material as a thought experiment that balances the line of what we know, what we imagine, and what we cannot know. This type of codicological speculation for understanding manuscript structure is not inherently tied to the use of the digital tool (even though this offers a conveniency that allows for different opportunities): sketching would also allow for exploring conjecture. The speculative possibilities that VCEditor presents should instead be seen as an explicit contrast to standardised institutional digitisation of manuscripts, which in many ways stabilises how the digitised book is seen.[68] The act of modelling, and therefore realising, an imagined reality of a possible or probable book-object merges research practice with scholarly imagination and technological intervention, and with that, I would argue, virtualising the medieval material.

[43] Porter presented her thoughts about speculative codicology in March 2025 at the Lilly Library in Bloomington, Indiana, and at the International Medieval Congress in Leeds in July 2025, in which she related it directly to her – and possible other – uses of VisColl.[69] She presented some ideas about what she calls her ›Franken-Book-of-Hours‹: a cobbled-together manuscript that never existed, made out of quires from different books of hours kept in multiple collections. She uses VCEditor to visualise various quires into a single collation model, making an entirely new speculative book. With this project, Porter takes ideas about speculative fiction presented by Marek Oziewicz as an important inspiration, which he describes as »deliberately depart[ing] from imitating ›consensus reality‹ of everyday experience«.[70] She shows how the construction of books of hours could fit together in different ways by bringing together multiple books into one structure (which was not uncommon practice in the Middle Ages). Porter took this idea one step further and printed and bound the ›Franken-Book-of-Hours‹, creating another level of physical and material speculation.

[44] For Porter, speculative codicology is explicitly based in the fictional: in that which does not and has never existed. This is different to what she calls ›historical‹ codicology, like the reconstruction of the Beauvais Missal, in which the scholar attempts to recreate something that existed at some point in time. Traditional methods, like Lachmann's, strive to reconstruct a kind of archetype, a perfect beginning point to an object. To Porter this is the difference between attempted fact and intended fiction. Speculative codicology is a space in which the fictional can be explored – even the completely fictional, according to Porter, in which non-existent books get a place in codicological practice.[71] I argue to differentiate between reconstructive modelling and speculative modelling, not in their degree of fictionality, but in their dealing with uncertainty. This perspective suggests that the line between fact and fiction (be it attempted or intended) is not so clearly drawn. The speculative points to this liminal space between fact and fiction, as opposed to being fully integrated in the fictional – or the ›deliberate departure from consensus reality‹, as Oziewicz says. In that sense, I believe that neither speculative nor what Porter calls ›historical‹ modelling is looking for an objective archetype. Instead, the speculative seeks to explore this liminality between fact and fiction, allowing for the creation and recreation of historical (constructed) reality in the space it opens.

[68] Cf. van Haaren 2025b.
[69] Porter 2025a; Porter 2025b.
[70] Oziewicz 2017.
[71] Cf. Porter 2025a.

Speculative modelling, for me, begins with the materiality of the manuscript and the reality of knowns and unknowns it presents. This may also be the materiality of a cobbled-together manuscript, or, as Porter also suggests, one can imagine even a manuscript that is completely fictional: as long as something about this book is materially (and structurally) important. From this, speculative modelling helps imagine a potential object – or, usually, multiple potential objects. The speculative starts from a point of uncertainty that can be filled with prediction and conjecture – with a theoretical construction of sorts. [45]

Figure 9: Speculative visualisation of the collation of Kislak Center, LJS 479, in VCEditor. [Screenshot and collation model: Suzette van Haaren 2026]

My own speculative collation model for manuscript LJS 479, housed at the Kislak Center at the University of Pennsylvania, is one attempt to reconstruct the manuscript's original quire structure using VCEditor (cf. Fig. 9). The booklet containing moral and medical texts was previously part of a larger miscellany written in fourteenth century Italy but now consists of a few fragmented quires and is no longer bound in the correct order. However, its early modern foliation has left evidence for its possible original structure and makes it quite easy to conclude which leaves are missing. In my analysis of the manuscript, I have made an accurate model, displaying the current situation of its fragmented collation, and a speculative model, where I experimented with its possible collation. Where the accurate model just shows three quires and a total of eighteen leaves (in accordance with its current state), the speculative model shows us (as the early modern foliation also reflects) that the manuscript was at least fifty-one leaves in five quires. Undoubtedly, the manuscript was much larger, but I kept my speculation close to the known material reality. The absent leaves and quires are tagged as ›missing‹ in the speculative model. Furthermore, the model also maps the continuation and location of the texts. Because of the book's current layout, it is evident that the quires all consist of five bifolia, except, confusingly, for the missing quire 4, which must have had an added leaf. This is conjecture based on the early modern foliation. Such speculation is at the heart of this experimental model but also makes clear the uncertainty of its creation. This model is, of course, only a small experiment in my own exploration of the digital tool. [46]

VCEditor provides a space in which the technology is open to speculation and thinks alongside the scholar. The curation of data is no longer only dependent on what flows from the scholar's hands, nor only on what the institution provides for the scholar to work with: the digital environment allows for the practice of data entry, and the data itself, to become part of the thinking (and imaginative) process. And this room for [47]

experimentation, as Porter has shown, also leaves room for play with potential fictional creations. The models created in VCEditor are uniquely virtual objects, as they merge medieval material with digital possibilities within the framework of scholarly imagination and its role in knowledge production.[72]

[48] Beyond its function as a digital reconstruction, speculative collation modelling contributes to the epistemology of manuscript studies by emphasising the knowledge production. The use of tools like VCEditor reflects a shift towards a more conceptual and digital engagement with historical objects, allowing for the testing of hypotheses and the exploration of multiple possible pasts. While the speculative model of LJS 479 was not made to serve as a formal model, it serves as an intellectual exercise in which my personal research interests served as its basis. The accurate model I made, on the other hand, will be used on the Colenda Digital Repository at Penn Libraries, where it is an institutionally digitised object.[73] VCEditor's open accessibility and flexibility consequently provides both a platform for creating models that are placed in an institutional and standardised environment, as well as a personalised working space where scholars can tinker and play around with their objects. This allows for an experimental idea of what manuscript data can mean and invites experimentation in daily research practices.

[49] In that line, we can also imagine how VCEditor could open new avenues for exploring other types of layered cultural objects. For example, the tool could be extended to modernist literary texts, where it could help unravel the multiple layers of diegesis embedded in such works, employing the software to represent layered theories or ideologies, by visualising how concepts interconnect and fold into one another. Or it could be applied to the study of historical events, offering a way to visualise and map out the different layers of interpretation, perspective, and temporal shifts that shape the narratives surrounding those events. The potential uses of VCEditor may extend beyond codicology, offering metaphorical ways of interacting with complexly layered objects of study.

7. Conclusion

[50] Digitisation, Bill Endres argues, is always motivated by the scholarly effort to »intervene in the current state of knowing«.[74] Manuscript scholars want to know more about a manuscript and thus use the digital technologies at their disposal to look at it more closely. With this interpretation, Endres returns digitisation back to the realm of scholarly method, explicitly describing the process as an attempt to digitally capture aspects of manuscripts' materialities.[75] VCEditor, as the implementation software for the VisColl Data Model, provides an environment in which digitisation lies in the hands of the scholar themselves and in which they get to create and manipulate their own research objects. This differs to standardised digitisation, which is usually the result of large-scale institutional effort (including financial and technological availabilities) and the product presented online provides the information that is deemed institutionally important.[76] The collation models made in VCEditor show the intentions of the individual scholar and the uses the models may serve: sometimes simple, sometimes complex; sometimes sparse, sometimes dense in information. Digital collation models created in VCEditor by the interviewed users are meant to document (›documenting‹ models), to deconstruct and recreate (›reconstructive‹ models), and to speculate (›speculative‹ models) about their medieval research material.

[72] Cf. van Haaren 2025a.
[73] At date of writing, the collation model is not added to the digital object yet; cf. [Moral and Medical Miscellany] LJS 479, Penn Libraries catalogue record, cf. also Colenda Digital Repository record.
[74] Endres 2024, p. 186.
[75] Cf. Endres 2024, pp. 185–189.
[76] Endres complicates this difference between ›standardised‹ digitisation, which still contains some level of scholarly intervention, and what he calls ›imaging‹, which to him lacks scholarly intervention. However, he remains relatively unclear on this matter throughout his article. Cf. Endres 2024, particularly footnote 5, p. 186.

[51] The process of entering and manipulating data about manuscript structures in VCEditor shapes users' experiences and offers a specific way for scholars to »think through«[77] their research material. It fundamentally echoes non-digital research practices like sketching or physical unbinding. On the other hand, the digital environment presents the user with a structurally mediated workspace, which facilitates and shapes interactive engagement with historical data that encourages scholars to consider their book-objects. User 1 describes it as »a useful exercise […] thinking about how to structure my data«.[78] The act of digitally modelling manuscript structure, in a way, is a de- and rebinding of the book-object in which its structure can be visualised, manipulated, and re-imagined. Its simultaneous flexibility and structured nature create space for imaginative exploration and experimentation of the material.

[52] It is clear, then, that VCEditor offers a totally different kind of material interaction, research environment and research object than non-digital methods do. The interviews show us, however, that working with VCEditor does not necessarily lead to radical changes in knowing: digital innovation in medieval studies is often a reproduction of traditional methods and questions. Some interviewees cite that the modelling process is »the basis of new ideas, of ways of thinking about the book«.[79] Some interviewees do not express that they experience using VCEditor as a means of generating novel research questions and answers. For them, other aspects – documentation, design, ease of use – are more important.

[53] This study suggests that the potential epistemological change in current digital medieval studies does not lie in a radical change of method, but in a change of mediating technology and technological capabilities. Moving working environments to the digital world fundamentally shapes the space and the daily practice in which knowledge is created. The collation models created in VCEditor are, therefore, not only a documentation of the material reality of the manuscript, but also an apparatus through which the historical material is understood, and, consequently, a primary source in scholarly research. With that, the VCEditor software environment (and the underlying VisColl Data Model) is a mediated contributor to scholarly research that enables digital technology to play a significant role in historiographic processes and, in the collaborative process with the scholar who uses it, to shape our understanding and perception of medieval material. It underscores the role of both human and technological curation in shaping the histories that scholars write. And it is at this point of interactive engagement between medieval material, scholar and software, where the ›virtuality‹ of the collation model is situated.

[54] The VisColl project has produced a digital tool that is easily accessible, user-friendly and widely used – also outside of medieval manuscript studies. This is, of course, the result of new technological possibilities. However, I find it important to end with highlighting the importance of the community of scholars who drive these innovations. The interviewed scholars and developers recounted their experiences of collaboration – sometimes in the same physical space, sometimes across continents – to build, modify, and share their collation models. The ingenuity, collaboration and adaptability shared in these digital scholarly exchanges are fundamental for the questions we can ask of our research material and allow us to continually push the boundaries of what is possible in digital humanities. The ›lifeworld‹ of the medievalist in this post-digital landscape has become one of constant negotiation between traditional scholarly methods and the different possibilities afforded by digital tools. While collaboration has always been a cornerstone of academic work, the increasing digital way of working seems to have amplified the need and the desire for interdisciplinary partnerships. The strength of this community does not only lie in its technical innovations but also in its ability to foster and sustain collaborative relationships that advance medieval studies, digital humanities, and the people who make these things possible.

[77] Interview with user 2, 19 April 2024, time stamp 00:27:47.
[78] Interview with user 1, 17 April 2024, time stamp 00:34:14.
[79] Interview with user 3, 22 April 2024, time stamp 00:40:35.

Bibliography

Gemma Elizabeth Aburn / Merryn Gott / Karen Hoare: Experiences of an Insider Researcher – Interviewing Your Own Colleagues. In: Nurse Researcher 29 (2021), no. 3, pp. 22–28. 17.06.2021. DOI: 10.7748/nr.2021.e1794

Karen Barad: Meeting the Universe Halfway. Quantum Physics and the Entanglement of Matter and Meaning. Durham, US-NC 2007. DOI: 10.1515/9780822388128

Coralie Barbe / Florence Malo: Définir la conservation-restauration des Très Riches Heures. In: Mathieu Deldicque (ed.): Les »Très riches heures du duc de Berry« [exhibition: Musée Condé du Château de Chantilly, salle du Jeu de Paume, Chantilly, 07.06.–05.10.2025]. Paris 2025, pp. 424–437. [GVK record]

Alberto Campagnolo: »Bit by bit«. Is the Book as an Object Entering the Digital World? In: Alberto Campagnolo / Lucia Catalano / Rosalia Claudia Giordano / Gabriele Lo Piccolo (eds.): I Beni Bibliografici nelle strategie dei fondi europei. Siracusa, ISISC, 3–4 dicembre 2015: Atti del Convegno (= Quaderni della Soprintendenza dei Beni Culturali ed Ambientali di Siracusa / Studi, 2). Palermo 2015, pp. 91–112. PDF. [online]

Alberto Campagnolo: Insides and Outsides. In: Alexandra Gillespie / Deidre Lynch (eds.): The Unfinished Book (= Oxford Twenty-First Century Approaches to Literature). Oxford 2020, pp. 47–61. [GVK record]

Alberto Campagnolo / Dot Porter: Modelling and Visualizing the Collation Structure of the Great Biblical Codices with VisColl. In: Russell E. Fuller / Armin Lange / Marilyn Lundberg / Todd Russell Hanneken (eds.): Textual History of the Bible. Volume 3: A Companion to Textual Criticism. Volume 3D: Science, Technology, and Textual Criticism. Leiden etc. 2022, pp. 133–142. [GVK record]

Alberto Campagnolo / Dot Porter / Erin Connelly / Doug Emery / Dennis Mullen: Virtually Disbinding Codices: Visualisation of the Construction of Codex Textblocks. In: Matthew James Driscoll (ed.): Care and Conservation of Manuscripts 16. Proceedings of the Sixteenth International Seminar Held at the University of Copenhagen 13th–15th April 2016. Copenhagen 2018, pp. 77–90. [GVK record]

Mary-Lyon Dolezal: Manuscript Studies in the Twentieth Century: Kurt Weitzmann Reconsidered. In: Byzantine and Modern Greek Studies 22 (1998), pp. 216–263. DOI: 10.1179/byz.1998.22.1.215

Anna Dorofeeva: Visualizing Codicologically and Textually Complex Manuscripts. In: Manuscript Studies: A Journal of the Schoenberg Institute for Manuscript Studies 4 (2019), no. 2, pp. 334–360. DOI: 10.1353/mns.2019.0015

Rob Dückers / Ruud Priem: The Hours of Catherine of Cleves: Devotion, Demons and Daily Life in the Fifteenth Century. New York etc. 2009. [GVK record]

Carolyn Ellis / Tony E. Adams: The Purposes, Practices, and Principles of Autoethnographic Research. In: Patricia Leavy (ed.): The Oxford Handbook of Qualitative Research. Oxford 2014, pp. 254–276. DOI: 10.1093/oxfordhb/9780199811755.013.004

Bill Endres: Digitization as Scholarly Intervention and Interpretive Act: A Case for 3D Capture in Studying the Agency of Materiality. In: Manuscript Studies: A Journal of the Schoenberg Institute for Manuscript Studies 9 (2024), no. 2, pp. 185–221. DOI: 10.1353/mns.2024.a945373

Mateusz Fafinski: Facsimile Narratives: Researching the Past in the Age of Digital Reproduction. In: Digital Scholarship in the Humanities 37 (2022), no. 1, pp. 94–108. DOI: 10.1093/llc/fqab017

Lisa Fagin Davis: The Beauvais Missal: Otto Ege's Scattered Leaves and Digital Surrogacy. In: Florilegium 33 (2016), pp. 143–166. [GVK record]

Lisa Fagin Davis (2019a): Beauvais Missal – Virtual Reconstruction. In: Fragmentarium. 19.11.2019. HTML. [online]

Lisa Fagin Davis (2019b): Reconstructing the Beauvais Missal. 2019. HTML. [online]

Folger Shakespeare Library: Impos[i]tor. 2011. [online]

Martin Foys: The Remanence of Medieval Media. In: Jennifer E. Boyle / Helen J. Burgess (eds.): The Routledge Research Companion to Digital Medieval Literature. London 2017, pp. 9–30. DOI: 10.4324/9781315696041-2

James Grier: Lachmann, Bédier and the Bipartite Stemma: Towards a Responsible Application of the Common-Error Method. In: Revue d'Histoire des Textes 18 (1988), pp. 263–278. [online]

Johann Peter Gumbert: Codicological Units: Towards a Terminology for the Stratigraphy of the Non-Homogeneous Codex. In: Segno e testo. International Journal of Manuscripts and Text Transmission 2 (2004), pp. 17–42. [GVK record]

Suzette van Haaren (2025a): LJS 479, Moral and Medical Miscellany. A Speculative Collation Model. In: Virtuelle Lebenswelten. Sonderforschungsbereich 1567 an der Ruhr-Universität Bochum. 02.05.2025. HTML. [online]

Suzette van Haaren (2025b): The Digital Medieval Manuscript. Material Approaches to Digital Codicology (= Studies in Art & Materiality, 10). Boston 2025. DOI: 10.1163/9789004737815

Donna Haraway: Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. In: Feminist Studies 14 (1988), no. 3, pp. 575–599. [GVK record]

Torsten Hiltmann: Vom Medienwandel zum Methodenwandel. Die fortschreitende Digitalisierung und ihre Konsequenzen für die Geschichtswissenschaften in historischer Perspektive. In: Karoline Dominika Döring / Stefan Haas / Mareike König / Jörg Wettlaufer (eds.): Digital History. Konzepte, Methoden und Kritiken Digitaler Geschichtswissenschaft (= Studies in Digital History and Hermeneutics, 6). Berlin etc. 2022, pp. 13–44. DOI: 10.1515/9783110757101-002

Tim Ingold: Dreaming of Dragons: On the Imagination of Real Life. In: Journal of the Royal Anthropological Institute 19 (2013), no. 4, pp. 734–752. DOI: 10.1111/1467-9655.12062

Christoff Kleinfelder: Text – Codex – Library. The Sunte Marien Wortegarde between Institutional Practices and Literary History. In: Kristin Flugel / Alexander Lang / Christina Lechtermann / Norbert Ricken / Tatjana Scheffler / Joachim Scholz / Estrid Sørensen (eds.): Infrastructures of (Non-)Knowledge. Virtuality and Epistemic Transformations. Bielefeld 2026. [online]

Bruno Latour / Steve Woolgar: Laboratory Life: The Social Construction of Scientific Facts (= Sage Library of Social Research, 80). Beverly Hills 1979. [GVK record]

Paul Maas: Textual Criticism. Oxford 1958. [GVK record]

Isabella Magni / H. Wayne Storey / John A. Walsh / Francesco Marco Aresu (eds.): Petrarchive. An Edition of Petrarch's Songbook Rerum Vulgarium Fragmenta. Bloomington, US-IN 2013–2023. HTML. [online]

Lambros Malafouris: How Things Shape the Mind. A Theory of Material Engagement. Cambridge, US-MA 2013. [GVK record]

Lambros Malafouris: Thinking as »Thinging«: Psychology With Things. In: Current Directions in Psychological Science 29 (2020), no. 1, pp. 3–8. DOI: 10.1177/0963721419873349

Robin Alison Mueller: Episodic Narrative Interview: Capturing Stories of Experience with a Methods Fusion. In: International Journal of Qualitative Methods 18 (2019). DOI: 10.1177/1609406919866044

Marek Oziewicz: Speculative Fiction. In: Deidre Shauna Lynch (ed.): Oxford Research Encyclopedia of Literature. Oxford etc. 2017. DOI: 10.1093/acrefore/9780190201098.013.78

Anne Tjerk Popkema / Riemer Janssen / Herre de Vries: De Richthofenkolleksje. Codicologische en inhoudelijke beschrijvingen van de tien handschriften, inclusief bezittersgeschiedenis. 23.03.2023. DOI: 10.5281/zenodo.7764244

Dot Porter (2022a): Manuscript Loss in Digital Contexts. In: Dot Porter: Dot Porter Digital. 16.02.2022. HTML. [online]

Dot Porter (2022b): Visualizing Collation in the Hunterian Manuscript Collection. In: University of Glasgow Library Blog. 01.07.2022. HTML. [online]

Dot Porter (2022c): Modelling the Historical Manuscript: Theory and Practice. In: Dot Porter: Dot Porter Digital. 05.07.2022. HTML. [online]

Dot Porter (2025a): Speculative Codicology. In: Dot Porter: Dot Porter Digital. 25.04.2025. HTML. [online]

Dot Porter (2025b): A Franken-Book-of-Hours: From Physical to Digital and Back Again. In: Dot Porter: Dot Porter Digital. 21.07.2025. HTML. [online]

Dot Porter / Alberto Campagnolo / Erin Connelly (2017a): VisColl: A New Collation Tool for Manuscript Studies. In: Hannah Busch / Franz Fischer / Patrick Sahle (eds.): Kodikologie und Paläographie im Digitalen Zeitalter 4 / Codicology and Palaeography in the Digital Age 4 (= Schriften des Instituts für Dokumentologie und Editorik, 11). Norderstedt 2017, pp. 81–100. [GVK record]

Dot Porter / Alexandra Gillespie / Alberto Campagnolo / Laura Mitchell / Rachel Di Cresce (2017b): VisColl: Modeling and Visualizing the Physical Structure of Medieval Manuscripts, a Poster and Demonstration. In: Rhian Lewis / Cecily Raynor / Dominic Forest / Michael Sinatra / Stéfan Sinclair (eds.): Digital Humanities 2017. Conference Abstracts. McGill University & Université de Montréal, Montréal, Canada, August 8–11, 2017, pp. 778–779. PDF. [online]

Christoph Richter: Digital Sketching. Aesthetic Practices and Technological Entanglements. In: Ethnography and Education 15 (2020), no. 3, pp. 334–349. DOI: 10.1080/17457823.2020.1724170

Stefan Rieger / Armin Schäfer / Anna Tuschling (eds.): Virtuelle Lebenswelten. Körper – Räume – Affekte. Berlin etc. 2020. DOI: 10.1515/9783110638127

Erik Rietveld / Julian Kiverstein: A Rich Landscape of Affordances. In: Ecological Psychology 26 (2014), no. 4, pp. 325–352. DOI: 10.1080/10407413.2014.958035

Jonathan Roberge / Robert Seyfert: What Are Algorithmic Cultures? In: Robert Seyfert / Jonathan Roberge (eds.): Algorithmic Cultures. Essays on Meaning, Performance and New Technologies (= Routledge Advances in Sociology, 189). London 2016, pp. 1–25. [GVK record]

Kathryn Margaret Rudy: Piety in Pieces. How Medieval Readers Customized their Manuscripts. Cambridge, UK 2016. DOI: 10.11647/OBP.0094

Wilhelm Scherer: Lachmann, Karl. In: Historische Commission bei der Königlichen Akademie der Wissenschaften (ed.): Allgemeine Deutsche Biographie. 56 volumes. Munich etc. 1875–1912. Volume 17 (1883), pp. 471–481. [online]

Jana Schillinger: Von der Detektivarbeit einer kodikologischen Novizin: Eine Autopsie der Lagenstruktur *Dom. Cod. 83-II*. In: DH@BUW. 06.12.2022. HTML. [online]

Jakub Šimek / Peter Schmidt / Christian Schneider (eds.): Welscher Gast digital. Heidelberg 2015. DOI: 10.11588/edition.wgd

David J. Staley: Historical Imagination. London 2020. DOI: 10.4324/9781003127109

Sanneke Stigter: Autoethnography as a New Approach in Conservation. In: Studies in Conservation 61 (2016), sup2, pp. 227–232. DOI: 10.1080/00393630.2016.1183104

Elaine Treharne: Perceptions of Medieval Manuscripts. The Phenomenal Book. Oxford 2021. DOI: 10.1093/oso/9780192843814.001.0001

VisColl: About. In: VisColl. 2022. HTML. [online]

Michelle R. Warren: Holy Digital Grail. A Medieval Book on the Internet (= Stanford Text Technologies). Stanford 2022. [GVK record]

Laura Watts: Energy at the End of the World. An Orkney Islands Saga (= Infrastructures). Cambridge, US-MA etc. 2018. [GVK record]

Matthew J. Westerby: Crossroads and Quaternions: Possibilities of Digital Platforms for the Study of Miscellaneous and Composite Codices. In: Journal of Medieval Iberian Studies 14 (2022), no. 1, pp. 166–179. DOI: 10.1080/17546559.2021.2015077

Bridget Whearty: Digital Codicology. Medieval Books and Modern Labor (= Stanford Text Technologies). Stanford 2022. [GVK record]

Adam Wickberg: New Materialism and the Intimacy of Post-Digital Handwriting. In: Trace 4 (2020), H. 4. 11.03.2020. HTML. [online]

List of Figures

Figure 1: Visualisation of the collation of the Hours of Catherine of Cleves, Morgan Library, M. 917 and M. 945. [From: Dückers / Priem 2009, p. 107]

Figure 2: Visualisation of the collation of Bern, Burgerbibliothek, ms. Lat. 611 (made in draw.io). [From: Dorofeeva 2019, p. 347]

Figure 3: Visualisation of the collation of Gotha, Forschungsbibliothek, Cod. Memb. I 120 in the *Welscher Gast digital*. [From: Šimek et al. (eds.) 2015]

Figure 4: U-shaped visualisation of the collation of Kislak Center, LJS 216 in VCEditor. [Screenshot and collation model: Suzette van Haaren 2026]

Figure 5: Tabular visualisation of the collation of Kislak Center, LJS 216 in VCEditor. [Screenshot and collation model: Suzette van Haaren 2026]

Figure 6: Sketches of the collation of Codex Roorda, Tresoar, ms. R 6 in the Richthofen Kolleksje. [Sketches and scan: Herre de Vries 2026]

Figure 7: Visualisation of the collation of quire 4 and 5 in Codex Roorda, Tresoar, ms. R 6 in the Richthofen Kolleksje. [From: Popkema et al. 2023, p. 100; collation model: Herre de Vries]

Figure 8: Visualisation of the collation of Kislak Center, LJS 216, in VCEditor, showing the ›outer bifolia‹ view of the images. [Screenshot and collation model: Suzette van Haaren 2026]

Figure 9: Speculative visualisation of the collation of Kislak Center, LJS 479, in VCEditor. [Screenshot and collation model: Suzette van Haaren 2026]